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A Cultivated Traveller on Art Abroad.

A BELGIAN man of letters, known on the Continent by his works on the rural economy of Belgium and of Holland, on the instruction of the people, and on the primitive forms of property, made a tour in Italy at the close of 1878 and during the early part of 1879. His object was, not to see the country and the works of art, with which he was already acquainted, but to study on the spot the changes produced by the recent political transformation of Italy. Notes of his journey were published at the time, and have been recently collected in a volume. The clearness of his views, and the beauty of his language, give a value to a work which in its form is essentially fugitive. Some of his pen-and-ink vignettes illustrative of Italian art will be welcome to many readers. Some of the remarks, especially those on the motives of architectural details, if not altogether novel, are well put, and admirable in their truth.

"The monument of Maximilian at Innspruck," says the letter-writer, "with which I was not previously acquainted, made a great impression on me. The bas-reliefs of the Mausoleum, in white marble, form a base too fragile to support the statue of the Emperor which surmounts it. But all around, and between the columns, are ranged twenty-eight colossal statues in bronze, which have an overpowering effect. They are those of the ancestors of Maximilian, the Dukes of Burgundy, Philip the Good, Charles the Bold, and the Archdukes of Austria; then Philip le Bel and his Queen, Clovis in the costume of a Hungarian magnate, and King Arthur as a knight sheathed in iron,—a true *chef-d'œuvre*. Elegance, force, grace, nobleness in pose, all are here united. It is equal to the 'Penseroso' of Michelangelo."

Let us now cross the Alps. The date is in the month of November, just two years ago. "Even," says the author, "at this season Venice is a wonder. It is the only town which no other town is like. The sea, raised by the wind, which drives it landwards, struggles with a strong current in the canals, breaking over the Place of Saint Mark, and penetrates even to the cathedral. It is transparent, pure, and of the most beautiful green, instead of being yellow and stagnant as in the summer. The water, clear, living, joyous, bathes and reflects the ancient and sombre palaces. It is a breath of youth in the old city.

St. Mark's is the only church in Italy which produces a complete and unmixed impression. The interior of the Duomo at Milan is very fine, but the exterior is overloaded and not in pure taste; one might call it a cathedral in alabaster or in sugar. At Rome, St. Peter's is overwhelming in its grandeur, but spoiled by the profusion of ornaments. The façade is a failure. The churches of Orvieto and of Sienna are jewels, but they do not awaken the religious sentiment. The Pantheon is a perfect monument; but it is a Pagan temple, not a church."

A month later the writer is at Rome. He visited anew, he says, St. Peter's throughout, from the peristyle at the entrance to the summit of the ball. "It is a prodigious, astonishing, monument, but in bad taste. Michelangelo has wrought a miracle; he has reared the Pantheon in the air, but with what result? I love far more the Pantheon solidly planted on the earth, with its low cupola, allowing the light to fall through its circular aperture, opening directly under the vault of heaven; a simple and beautiful idea. The side windows at St. Peter's resemble those of a palace, and are out of place in a temple. Architecture is an art over which Reason and Taste should preside. Every detail should have its object. The Greeks have admirably comprehended this; thus in the Parthenon there is nothing without a motive. Therefore their works are perfect. Michelangelo, in spite of his stupendous genius, was the great corrupter of taste. Everywhere he sought effort, the extraordinary, the violent. See his Sibyls and his prophets on the Sistine Chapel. Our architects too often follow his example. Their edifices do not correspond to the object for which they were built.

Look at the Palais de Justice at Brussels. It has great qualities; beauty of outline, force and harmony in its lines; but where is its symbolism? Where is the justification of the disposition? Nothing indicates for what purpose it was built. Why that dome or superstructure, whatever it be, that crowns the edifice? It is without use, and it impairs the general effect. The interior arrangements are detestable. The very aim of the building is sacrificed to the façade. It is unreason, that is to say, the antithesis of architecture, when, on the contrary, everything ought to have its reason. St. Peter's, opening above our heads at a giddy height its gigantic cupola, has at least the merit of giving an impression of the infinite which suits a church. The Gothic cathedrals are full of ideas, of symbols. They are books of stone, which set forth the doctrines of Catholicism to those who do not know how to read. It is the same with the temples of India and of Egypt. There, again, although in a form less perfect than that of Greece, the architect has understood his mission. The Roman monuments, the circus, the thermæ, the theatres, the amphitheatres, the forums, the aqueducts, correspond admirably to their destination. They display reason incarnate in marble. Both in exterior aspect and in interior decoration, the Pantheon is incomparably superior to St. Peter's."

We give these extracts, not as authoritative canons, nor as expressing altogether our own opinions, but as the original criticisms of a travelled and thoughtful scholar, which cannot be read without giving food for reflection. Here is another sketch.

"They talk to me much of an art-critic, well-known in Italy and in Germany, the Senator Giovanni Morelli. His special study is the art of verifying the authenticity of pictures. To arrive at the criterion, he studies with the most minute care, magnifying-glass in hand, the work of a master as to whom there is no doubt. If this painter has several styles, he takes a specimen of each. He examines the colours employed by preference,—each artist has his own, the touch of the brush, the particulars of design, the character of the figures, the drawing of the hands, the feet, the draperies, the landscape, the architectural traits. It is certain that each painter had, and still has, his own mode of seeing and of rendering objects. It is only necessary to understand this. Thoré, writing under the pseudonym of Bürger, has applied this mode of criticism to the pictures of the Dutch school with the most instructive delicacy of perception. The criticisms of M. Morelli have produced sensation and gained authority in Rome. Applying his process to the Borghese Gallery, he has demonstrated that the famous portrait of Cæsar Borgia, by Raffaelle, is not by Raffaelle, and does not represent Cæsar Borgia. A new road, in my judgment, is thus opened for the criticism of art. But to succeed in it demands long study, and a scrupulous patience, unwearied in the examination of details."

We reproduce with the more pleasure this account of the criticism of Signor Morelli, from the circumstance of having recently turned attention to the very subject. To become past master in such an art demands the study of a life. But even the time which can be spared from a busy life will accumulate much that is of value, if systematically employed. We are happy to be able to offer one original contribution to this mode of criticism, to which we shall be glad to call the attention of our readers and of Signor Morelli. Photography may be used to detect restoration or tampering with an old picture. We made the discovery by accident. Another Signor Morelli, a very admirable draughtsman, was some time since engaged in taking photographs of the pictures in our own National Gallery. Looking at the first proof of one of them, a well-known Madonna,—there was a disfiguring blur over the forehead. "Oh," said the photographer, "that is a first proof,—I will set that to rights in the negative." So, no doubt, he did. But it was the first proof that was of value. Visiting the Gallery to refresh remembrance of the picture, no such blur was to be seen,—to be seen at the first glance. But the magnifying glass showed, on careful inspection, that the restorer had been at work. He

had repaired some casual damage, and done it with a skill that reproduced the colour, the touch, and the texture of the painter. But he had not used the same pigments, and this was instantly detected by the subtle chemistry of light.

At a time when every study has a tendency to become so strictly special that anything like a knowledge of *ensemble* is regarded almost with suspicion, it is of unusual interest to collect the views taken by a man of general culture, a scholar and a traveller, on such points as those which we have cited. There can be little doubt that such opinions as those above quoted on architectural motives both represent the views of a certain and important public, and lead, in their turn, to extend and enforce these views. Unless the architect keeps in electric contact with such a current of thought, he will fall behind the age. The most lasting impression produced by such a work as we have been citing is the cardinal importance of general culture in the development of artistic excellence.

EARLY GREEK SCULPTURE.

The book which Mr. A. S. Murray, of the British Museum, publishes under the title "History of Greek Sculpture"* would perhaps be better described under the heading we have given; at least, most readers would not be likely to gather from the present title that they were taking up a book in which the works which make the great glory and fame of Greek sculpture are hardly mentioned. It may be questioned even whether the word "history" can quite correctly be applied to the treatment of a subject in regard to which hardly any basis for historical accuracy as to facts can be said to exist. A review of the known remains of Greek sculpture, the probable dates of the various examples that are preserved, and the conclusions to be drawn, from the varieties of style observed in them, as to the progress of the art and the culture of the artists and their method of working, is fully possible, and this is really the nature of the work put forth by our author. But it seems a misnomer to speak of history where almost everything which is advanced as such is more or less conjectural; where the character of the work of this or that artist, whose date even perhaps is only approximately attainable, has to be conjectured from what is said of his work, in vague and ambiguous terms, by some ancient writer, who himself is often only repeating a tradition from some one else; and when the nearest that can be got to illustrating his work is to endeavour to connect with his name some isolated example which seems to answer sufficiently to the description of one of his statues. This can hardly be called history at the best; and our impression is that of all the conjectures on these points nothing more than possibility is proved as to any definite fact; even probability is questionable. The book is a study of the remains of Greek sculpture, not a history; and as such is of much value and interest, especially for general readers. It brings together within convenient compass much of what is known and conjectured on the subject, combined with theories and suggestions of the author's which are calculated at least to set the reader thinking, and with a considerable number of well-executed illustrations of objects of art bearing on the subject.

The introductory chapter on the theory and general principles which limit the art of sculpture is pretty much what has been often said before, sometimes a good deal better said,—for perspicuity of literary style and logical progression of the argument are not very conspicuous in the author's writing, and the reader has at times to take a good deal of trouble to find out the relation of one statement with another, and the point towards which the author is progressing. There is, however, a good and practically useful generalisation in the opening paragraph, in the remark that in the earlier stage of Greek art, progress was chiefly in the way of acquiring facility in the use of the material, while in the later stage the effort was to obtain fulness of knowledge of the original from which the artist worked. This, though susceptible of question in some points of view, is a good working generalisation; perhaps impressing one the more as such from its appearing at the close of a somewhat clumsily-expressed exordium. "In language a thought, and the form in which it is expressed, must be conveyed through a new medium; while in art the essential character of the object is reproduced in a new material. For both there must be freedom, but not without these limits." What limits? We can guess, of course, what must be the meaning intended, but the sentence in itself conveys no meaning to any one who has not the idea in his mind already. In this and other parts of the book we seem to meet with repetitions of what are now almost commonplaces of artistic criticism, but expressed in a very unintelligible, or, at least, awkward form. The sentence on page 12, as to "physical and moral turpitude being so closely allied in the judgment of the Greeks, and both equally detestable," is rather surprising. It is the great charge against the Greeks that moral turpitude was not nearly as hateful to them as it ought to have been; and the fact was not that physical and moral turpitude were closely allied in their eyes, but that physical imperfection was regarded as so serious an evil that a man was liable to be as much depreciated on account of it as if he were morally base, or even more so; which is a different thing from regarding the two qualities as closely allied.

The second chapter touches on the evidences as to the degree of power in various handicrafts and in the working of various materials which had been reached at the epoch represented by Homer; *i.e.*, of course, the epoch when the author or authors of these poems lived, not those which they profess historically to describe. In the next chapter a curious attempt is made to reconstruct the shield of Achilles from antique remnants of art, the process having been to copy from the most ancient authentic source a representation of each of the incidents said to have been represented on the shield, and then combine the whole, we presume with some modifications in detail, into the arrangement of the shield-subjects as described by Homer. But, in order to afford a more natural suggestion, in the shape of the shield, for the grouping and separation of the subjects, the author adopts a form of shield not circular, but with deep indentations on two opposite points of its margin, which cut into and divide the subjects, so as to necessitate a grouping of them, and interrupt their progression round the whole circle. For authority for this shape the author quotes two vases, one in the British Museum and one at Berlin. We do not in the least question the validity of the authorities, but they are absurdly inadequate against the overwhelming number of representations of circular shields in existence, and against the positive impression of a circular shield which the Homeric narrative conveys to us. One point alone seems to us conclusive, the placing of the conventional representation of ocean round the rim of the shield. This is a most natural idea in regard to a circular shield, not only decoratively, but also physically, as the Homeric age believed that the sea encompassed and surrounded the earth: on the shield of the form conjectured by Mr. Murray, this decoration loses all its effectiveness and meaning. The designs on the shield form a curious piece of patchwork, but, no doubt, they are something more like what really was in the mind of the Homeric narrator than is Flaxman's beautiful reproduction; and it is well for readers to be practically reminded in this way that the art contemplated by the poets and people of the Homeric age was not the art of the complete Greek period. General readers are so apt to apply to anything with the name of "Greek" the ideas and forms most popularly connected with Greek art, that they do not recognise the fact that what passed for sculptural art in the Homeric time was something very different from the Parthenon frieze. Mr. Murray makes some good suggestions in favour of the idea of an Assyrian origin of the legend of the shield and its description. He observes that the incident which rendered the making of the shield necessary, the loss of his first shield by Achilles owing to his having lent his armour to Patroclus, seems not unlike an excuse for bringing in a familiar legend, and that the description was a traditional one. That would account, as he says, for the omission of any mention by Homer of ships as objects on the shield, if the description were originally invented by an inland people. The description of the Achillean shield has been an object of so much interest to all students of the history of art and art-workmanship, that no attempt to throw new light on the meaning of it can be considered as superfluous.

Among some remarks on what most of us regard as the more questionable elements in Greek sculptural practice,—questionable either historically or artistically,—we find it suggested that the use of gold and ivory for early statues of deities appears to have superseded an early custom of clothing them in actual drapery, doubtless richly embroidered with gold. "For these figures various kinds of wood were employed, such as ebony, cypress, cedar, oak, yew, lotos, olive, fig, and others, and from the pillar-like form of these figures it would seem that the trunk of the tree had been left unadorned, with nothing more than a head carved on it." We presume the author means to imply that the terminal figures so common in later Greek and in Roman art were merely the old trunk and head forms, as he supposes them, assuming a more definite sculptural shape, and without the actual drapery. The supposition appears not improbable, certainly, and gives an explanation of the origin of the terminal figure; though it is reducing the dignity of ancient sculptural art sadly to imagine any department of it, and that, too, the important department which consisted in the representation of the deities, as little better in principle than a modern milliner's lay figure. "Nor is it unlikely," he adds, "that the images often standing in country places to represent patron divinities consisted of trunks of trees left with their roots in the ground, and with a slightly fashioned human head and arms. As such appears the Dionysos Dendrites occasionally figured on painted vases." There may have been one excuse for treating the representations of the deities thus, one which often has influence over early ritualistic art,—namely, that as the mere representation or symbol of the god, the work gained an importance and sanctity which placed it beyond the necessity of attracting respect by a more elaborate attempt at artistic realism or effect. The use of ivory to supersede these draped statues might not unnaturally have also have been accompanied by realistic colouring, which would keep up the habit of expecting colour in statuary, and thus explain what seems to many of us the incongruous taste of colouring marble statues. Sculpture in marble, when it succeeded sculpture in wood and ivory, "was encumbered with this traditional use of natural colours. But sculpture in marble had no true opening till temples came to be built with splendour, calling for the same plastic enrichment on a colossal scale which previously had been developed, so to speak, on thrones and chests": and this is a very probable sequence.

In regard to the sculpture on the temple at Selinus, attention is drawn to the contrast between these sculptures,—archaic and almost grotesque as many of them are,—and the Egyptian type; to the rigid immobility of Egyptian sculpture, compared with the exaggerated forms and straining attitude of the limbs in the Selinus metopes, as in the well-known one of Perseus cutting off the head of a hideous Medusa. This exaggeration of forms and action the author regards as the effort of these early sculptors of the Greek school to realise life and movement in the figure. A remark which is made in the same chapter is worth bearing in mind; that Greek sculpture grew up chiefly under the practice of working in relief, and that consequently no difficulty would be experienced in representing violent action in such a medium, compared with what would be experienced by sculptors struggling with the imperfectly understood mechanism of the human form in the representation of figures in the round, which must necessarily be subject to conditions of mechanical balance that would not affect figures in relief. This serves, as he truly observes, to explain the contrast which may be noticed between the violent, if not very free or natural, action in figures in relief, compared with the stiffness and the cautious and tentative reserve of figures in the round belonging probably to the same period, and of which some examples are given.

We must refer the reader to the volume for the attempt to characterise the various schools down to the period of Phidias, as our author recognises them, and the characteristics of individual sculptors. Much of this is, as we have already hinted, little more than conjecture, and the balancing of one probability or possibility against another. The book can hardly fail to be useful to most of those who read it, by

* "A History of Greek Sculpture from the Earliest Times down to the Age of Phidias." By A. S. Murray, of the department of Greek and Roman Antiquities, British Museum. With illustrations. London: John Murray. 1880.

suggesting new ideas to them, bringing together a considerable number of old ones, affording a kind of summary of what has been said and suggested in reference to the subjects treated of, and also giving in the foot-notes useful references to standard works which may be consulted. But we must regard the work as a *résumé* of the thoughts and fancies of an archæologist, rather than as proving anything material in relation to the subject of which it treats.

ART AND ARCHITECTURE IN GERMANY AND AUSTRIA.

The above is the title of a paper from the pen of M. A. Turnei, engineer and architect, published in Germany. It reviews the architectural activity and the art efforts during the last few decades in Germany and Austria, and we on that account translate such portions of it as are likely to interest and possibly benefit students of Continental art and architecture in this country.

The author says that the efforts made in respect of art throughout Germany bear witness to a zeal which manifests itself not only in the establishment and development of collections, but extends its operations also to the localities in which they have been placed. Thus Frankfurt-on-the-Main has recently completed the almost monumental edifice holding the Städel Gallery, in Sachsenhausen; Hamburg, Stuttgart, Leipzig, Cassel, &c., have erected new buildings for their collections, which, it is true (as, for instance, the gallery at Cassel), do not always answer to the requirements which might be made with regard to arrangement and light. Those who have had occasion to inspect the old picture-gallery at the Belvedere at Cassel, and observed the inadequacy of space and light, will be agreeably surprised by the judicious arrangement and suitable lighting effect in the new gallery building.

The picture-gallery in the Neckarstrasse at Stuttgart suffers also from defective light, especially in the side cabinets. In the Museum at Berlin, and more particularly in the National Gallery, it is at certain times of the day simply impossible to examine the pictures hung in the smaller rooms, on account of the great reflection. The rooms in the Dresden Gallery which are lighted from above suffer likewise greatly from disturbing reflection, although otherwise this gallery, independent of its intrinsic value, must be classed among the most judiciously arranged collections. All these defects show how difficult it is to come up to all the requirements respecting lighting which must be insisted on in the case of a picture-gallery if its effect as a whole is not to be permanently injured. In Berlin a remedy has been supplied in the skylighted rooms of the Old Museum by screens, which are suspended free under the lantern, and which aid in neutralising the differences of light during the various parts of the day.

It is the same principle as that applied by King Ludwig I. of Bavaria in the case of the Rottmann landscapes in the New Pinakothek, Munich,—of course, here in a more complicated, more luxurious form, as an inserted porch; but the effect produced by this projecting roof in the lighting is extraordinary, as it is not easy to obtain by the direct operation of light. But the steady endeavour to take the practical requirements in this respect more into account than was formerly the case is becoming general, so that in a very short time Germans will possess a number of art institutions which may not only be described as excellent as regards their contents, but will be striking with respect to their interior arrangements.

There has been great architectural activity during the last ten years in the various capitals and smaller towns of Germany. Dresden has obtained in the Nicolai School (see *Builder*, March 8, 1879) a very healthy basis for a better development of architecture, and a series of new buildings in the English Quarter of the Old and New Town are excellent specimens. We need not especially refer to the Picture Gallery, nor the new Theatre, by Semper; they are specimens of architecture which, like his other works at Zürich, and the two Imperial Museums and the Hoftheäter at Vienna, will continue to be monuments of the first order.

Dresden has an advantage over other towns in possessing in the Elbe sandstone a cheap and excellent building material, but it is the custom to use it more for the walls themselves than for the facing of buildings. Notwithstanding the abundance of sandstone, the practice of cementing prevails largely in Saxony; visible brickwork is also very little represented.

Compared with Munich, the architecture of Dresden is in a more advanced state; the beautiful situation of the Saxon capital, the large influx of strangers, and also the great number of wealthy inhabitants, admit of the employment of larger means for secular architecture than on the average is the case at Munich.

The modern architecture of Dresden, compared with that of Munich, is more uniform,—nearly throughout in the Italian Renaissance style; while in Munich it is of the most motley description. Upon the Classic period of Ludwig I. followed the endeavour to produce a new style in the Maximilianstrasse, and upon this the period of Italian Renaissance of the Neurenther school; and at present there is an attempt at making German Renaissance the dominant style.

With respect to the latter experiment, Munich is not alone. At Vienna, such experiments have been more or less successfully made in the Reissnerstrasse, and at the new Justizpalast (see *Builder* of September 14, 1878), and by Dombaumeister Schmidt at various private buildings; but a more general introduction or supplanting of the prevailing Italian Renaissance has not been effected; the attempts have been isolated.

Such buildings have been more extensively erected in Berlin, where the undertakings in the Beuthstrasse, the Passage, and more recently in the Leipziger and Friedrichstrasse (see *Builder, passim*) have called into existence very excellent structures, which can no longer be classed among mere experiments. This cannot be asserted of Munich architecture, the works in the domain of German Renaissance, so far as they can be really included in that style, being merely experimental.

A very happy result has been effected in the façade of the Kunstgewerbehaus, Munich, and the endeavours to bring the interior into stylistic harmony with the outside deserves recognition, even if we do not agree with the mode of architecture which constructs vaulting and pointed arches of wood, and lines them with boards, as has been done in the large hall. But for the remaining undertakings in the province of German Renaissance at Munich, this could be generally admitted; they are far behind the Berlin works, and are devoid of a uniform character, which ought to be especially pronounced in this style of architecture. The *motifs* have not always been very well selected and carried out, and as far as the high-gabled façades (which seem to be greatly preferred) are concerned, they cannot be recommended for imitation; they are inferior to similar Middle-age gabled houses, as they may still be seen in Cassel, Cologne, and the Rhine towns, as well as in many other cities of Germany. Those fretwork gables are not praiseworthy specimens of German Renaissance, and, if they were more fully developed, would lead us back necessarily to the Rococo period; while, again, there are a whole series of really beautiful Renaissance buildings of the older period in Germany, which, like the Castle of Heidelberg, may be recommended. We need only look round among the older towns; the Castle of Offenbach, Aschaffenburg, a number of beautiful objects in the Rhenish cities, part of the Rathhaus of Lübeck, buildings in Berlin, and even in Eastern Prussia, for instance, in Görlitz and Breslau, deserve notice in this respect.

As far as the development of the German Renaissance is considered in its general typical features, it would, if truly and intelligently understood, be capable of fertile changes, and it would thus have a future; but as matters stand at present, and especially with regard to Munich undertakings in this department, much would have to take a turn for the better before it could compete successfully with the Italian Renaissance.

At present, and for a long time to come, the latter will retain the upper hand, and has found a home, in all small and large towns,—not, it must be admitted, to the disadvantage of art and its development.

In any case, it is desirable that in Munich architecture should emerge from the stage of mere experiment which has become chronic; that in that city not only builders and contractors, but also architects, should receive commissions from its citizens, a matter difficult to carry out in practice. At any rate, buildings such as we see in the Hessstrasse, which are devoid of the alpha and omega of architectonic ideas, would become scarcer, and thus a state of matters avoided which cannot recommend Munich, the first art-home of Germany, very much in the domains of art and architecture. If Munich did not possess the beautiful structures from the times of Ludwig I., the works of Neurenther, the Rathhaus of Hauberisser, and some of the better works of Schmidt, the city would be especially poor in striking specimens of architecture.

How different is the impression made by Stuttgart with regard to secular architecture. True, it has no imposing residential barracks, but the private residences are throughout of a pleasant and tasteful exterior, and their characteristics show that their owners think more of a better class of house than is the case in Munich.

In the same manner, if we walk through the villa-suburbs of Frankfurt-on-the-Main, Wiesbaden, Hamburg, &c., we gain the conviction that in those cities secular architecture assumes more and more a monumental and pleasing character, that the citizen is growing more select in his taste. Frankfort especially makes an agreeable impression in this respect (see *Builder, passim*); its villas of the outer periphery, and the buildings in the Kaiserstrasse, the new Exchange, the Opera-house, the Städelsche Institut in Sachsenhausen, represent to a large extent striking architectural objects. They are less structures run up by speculators than buildings demanded by modern requirements. They are the villas of rich merchants, such as we find them at Bremen, but especially in Hamburg. The latter city, which after the great fire of 1842 had such a splendid chance of carrying out the regulation and suitable reconstruction of the town, let this opportunity pass by, although there were present all the conditions required for a magnificent reconstruction, a desire expressed by Semper fifty years ago.

Notwithstanding, the rebuilding took place in the old angular fashion, narrow and rarely straight streets cross each other, and these are again enclosed as in a frame by residences of the ordinary type of older cities. As a contrast, the immediate neighbourhood outside the Public Grounds is of a more agreeable character. The whole series of villas along the Alster-Basin as far as Uhlenhorst and the immediate neighbourhood cause an excellent impression; they are mostly in the Italian Renaissance; the features of the city and neighbourhood would be much more imposing if changes had been effected in its interior and on the ramparts, and the Grounds of the Alster had been run round the whole town, as has been done in such excellent manner in Frankfurt-on-the-Main and at Leipzig. In this respect, Frankfurt has outstripped Hamburg; it does not possess such beautiful and riverine surroundings as the latter city, but it has spent more upon the town and its neighbourhood.

The greatest architectural stagnation prevails in Lübeck; everywhere else, in Wiesbaden, Coblenz, Cologne, Düsseldorf, Brunswick, Hanover, Cassel, &c., a greater or less activity has set in, and even smaller towns are not behindhand in proportion. Lübeck, on the contrary, has remained the town of the Middle Ages; all that is wanted to make the picture perfect is to replace the old inclosing walls, and to join them to the still existing gates. The number of modern buildings in Lübeck is limited, and even its surroundings show less of the suburbs of our time than we find them in all older cities, ever at Nürnberg. In proportion to its sister towns, Frankfurt, Bremen, and Hamburg, this city, formerly one of the principal ones, has remained far behind in the race; but as a town proper, with its historical monuments and sign-posts, it is more interesting than those: less modern, yet retaining the old healthy core and character.

There is a far greater number of towns which have preserved their architecture of the Middle Ages in Northern Germany than in the south. South Germany still possesses in Rothenburg on the Tauber, Markbreit, Ansbach, Nürnberg, especially in the latter, interesting types of old towns; but vandalism in modern garb is making sad havoc among the rare examples of Middle-age architecture,—pulling them down one after another; and tedious and uninteresting streets and houses take the place of romantic "Gassen" and buildings of a bygone age and departed art.

In North Germany also, though at present in a less degree, modern barracks push aside the best buildings of olden times. In Danzig, Königsberg, Breslau, — everywhere this ten-

dency shows itself in a dominating manner. Frankfurt-on-the-Oder and Görlitz have become quite modern towns, and although in the latter a great number of more ancient and highly interesting buildings have been preserved, the new town predominates.

On the whole, there exists in Germany a tendency to modernise, not always accompanied, however, by a happy result. The fact by itself would have incontestably to be declared a success if at the same time something better with regard to artistic progress were to more generally take the place of the old buildings; but in all the towns, large and small, with few exceptions, the work of building is in the hands of speculators and builders who have never, or very rarely, received a competent technical training, and whose talents are insufficient, in most cases, to replace by natural abilities what they are deficient in by study. It would be an idle attempt to try to teach the general public a better understanding. They do not possess the required judgment, and the freedom of trading in its most extensive application is nothing less than a preventive against relative excesses, and of the decadence in the art-domain of architecture,—and, as a further consequence, of the mechanic arts and art-industry.

In Vienna more caution has been used in this respect. The trade of the builder in that city, which has achieved most striking results in architecture and art industry, has never enjoyed such liberty as that any speculator without the necessary training and ability would be permitted to undertake building on his own accord. A special concession is necessary, which depends upon the capacity of individuals, and even builders by trade are compelled to employ an architect. These licences are withdrawn as soon as the builder offends in the matter of construction and safety of the buildings he erects, or when accidents happen through such neglect or incapacity; and it may be asserted that this system works wonderfully well, and deserves imitation elsewhere. What is wanted is not theoretical examination, which has sometimes very little practical value, but proof of capability, by showing that proper schools have been frequented and independent work executed in the special branch which has been selected.

It is only upon these lines that the right way for improvement in architecture and art-industry can be pursued. But this mode of progress may be aided very much by the assistance rendered on the part of governments, and especially of representative bodies. The latter more particularly often retard their development by withholding, from motives of false economy, the necessary funds required for the promotion of art and science, for the erection of public buildings, &c. These bodies, as a rule, do not consider that the means thus granted benefit the whole community, and that the state is bound to provide ways and means for future development, to remove obstacles, and to erect such landmarks as will direct a nation in the right way of progress. A rational and productive political economy, an increase of general prosperity, and the advancement of art and science, are practicable only on the basis of such principles.

VALUE OF BUILDING LAND AT MUSWELL HILL.

A BUILDING estate at Muswell Hill, consisting of about twelve acres, was sold at the Auction Mart, last week, by Messrs. Driver & Co. It is situated close to the Muswell Hill entrance to the Alexandra Palace, and within a short distance of the Hornsey and Crouch End Stations on the Great Northern Railway. It was described as well adapted for the erection of villa residences and shops, for which there is a great demand in the neighbourhood. After some active bidding, the estate was sold for 10,000*l.*, representing nearly 900*l.* an acre. This is said to be a larger sum than the average price which similar land in the locality has hitherto fetched. It was stated in the room that one of the metropolitan companies was the purchaser.

Sion College and St. Alphage's Church.—Mr. Charles Smith, vestry-clerk to the parish of St. Alphage, denies that the question of light as affecting the church has been arranged, and the parish is determined to maintain its rights. We simply reported what was stated at the auction. A model was, we believe, exhibited showing the way in which the difficulty would be surmounted.

NOISES.

RECENT revelations of science have shown that noise is a more comparative term than was previously supposed. So far as the special business of the builder is concerned, the word has been applied to what must now be looked upon as a very mediocre kind of vibration, when contrasted with the efforts of science to produce a really great noise. The consecutive system of architecture, which must necessarily prevail in large and densely-populated areas, has many disadvantages, and not the least of these is the conveyance of irrelevant sounds through the thin partitions that divide one building from another. The strains of a piano or the murmurs of conversation are seldom an acquisition when they come from a neighbour's house filtered through an ill-"deafened" wall. But the devices that are employed to avoid annoyance from causes of this sort are often sufficient if they are properly applied. The dirty mixtures of soot and other abominations are perhaps not very consistent with the highest conceptions of sanitation, but they are nevertheless sufficient in many cases to serve the purpose aimed at. The life of the tenant, however, would be a burden to him if his neighbour were given to making experiments with a steam-syren. We mention this instrument because it is constructed for the special purpose of making a "big" noise. It would be sufficient, under ordinary circumstances to keep a whole street from enjoying the blessings of sleep; and those of our readers who have heard it booming loud above the uproar of a storm, to warn ships from a dangerous headland in foggy weather, would probably be inclined to admit that its capacity for wakefulness would extend over the whole area of an average London parish. But if we take this as the maximum of noise which science has been able to produce, our wonder is exceeded by revelations as to what is going on around us that the ear unaided is not able to detect. The world of sound has just had its boundaries marvellously enlarged, with regard to vibrations that require special appliances in order to be heard. The microphone has been, in many respects, eclipsed by an instrument recently invented by Professor Graham Bell, to which he has given the name of the photophone. The general result of both instruments has been to show a mobility among the component particles of so-called solids that had never been more than suspected previously. The most tenable theories on the subject of heat seemed to demand as their foundation a certain kind and amount of atomic motion which appeared to be the only rational way of accounting for the phenomenon. Now it not only has transpired that such molecular movement does occur, but the vibrations even of light acting upon, or rather, to speak more correctly, among the particles of solid metals, have become audible to the human ear. It seems, in fact, that electricity, by reproducing the most delicate vibrations on an enlarged scale, is capable of doing for the human ear what the microscope has already accomplished for our organs of sight.

It can hardly be said that the vibrations are exactly reproduced. What reaches the ear is not an intensified continuation of the air vibrations originally set up by the movements of the molecules, but all the same we have, if not an exact copy, at least an audible proof of their existence. For several years the effect of light upon the metal selenium has been the subject of investigation among men of science, who have severally and separately contributed a number of facts with regard to its behaviour under the influence of various kinds of vibrations. These experiments have been conducted principally in relation to the effect of light upon the metal as a conductor of electricity. It appears that rays of a particular kind, falling upon selenium, increase its electrical resistance. This fact suggested to the mind of Professor Graham Bell that alterations in the intensity of light falling upon a sensitive surface of this kind might be reproduced as sound through the medium of another substance vibrating in accordance with the rapid alterations going on in the electrical conductivity of the selenium. This has been accomplished, and it now transpires that only a simple set of apparatus is required in order to convert the rays of the heliograph, which has already done such good service in the late campaign in Afghanistan, into the channel of actual speech.

This is, indeed, a startling announcement, and means that when the apparatus is perfected two persons, separated, it may be, by many miles, will be able to hear each other speak with nothing but a beam of light passing between them as the medium for reproducing the sound of their voices. Not contented with this marvellous application of known facts to practical purposes, the Professor has generalised the scope of his experiments, and shown that noise in the microphonic sense of the term is going on among solid bodies in a way that the microphone in its original form could have scarcely led one to expect. Light falling on selenium leads to a commotion among the particles of the metal which is alleged to be audible. There is no reason to suppose that other solid substances are proof against similar disturbances.

Such discoveries open up an almost new conception of what the world is made of. Truly there are "more things in heaven and earth than are dreamt of in our philosophy." No sooner has man removed the imaginative charm of the unknown from his every-day life by the exploration of every nook and cranny of the world he lives in than a new world is revealed to him that can only be groped into by the aid of scientific instruments. But what shall we say of organisms infinitely below ourselves in the scale of creation to whom, for all we know, this world of sound is as familiar as the vibrations of every-day life to the ears of ordinary humanity? Who knows but that the hearing organs of insects may be sufficiently delicate to detect the sounds which are quite beyond our power of perception?

In this view of their capabilities, perhaps the rising sun is to them the herald of an uproar among the particles of the surfaces upon which they move. The walls of a house or the panes of glass in a window may, during the continuance of daylight, be in a constant condition of audible vibration which only ceases with the advent of darkness. The effect of moonlight upon the electrical resistance of selenium has already been proved to have a character peculiar to itself. Who knows, then, but that the rising moon brings about a new order of sounds for the delicate organisms that are capable of detecting them? So long as we are startled by discoveries that call upon us to recognise the mystery of the infinitely little, we need not complain about the want of great additions to our knowledge of the infinitely great. Nevertheless, our acquaintance with the wonders of both seem to move on together. The revelations of the spectroscope informing us of the composition of distant planets is not less wonderful than the revelations about sound which are now engrossing the attention of the scientific community.

SOME CANADIAN INDUSTRIES.

To allay the anxiety of political economists, who know not how to dispose of surplus populations, retaining intact the body social, Emigration springs to the front and challenges attention. To this sharp remedy for the "frettings, aches, and cares" which beset the worker in old countries, statesmen and speculative people in general are growing resigned; statistics show that, spite of the enormous increase in emigration latterly, populations advance. As regards a large number of emigrants, their choice sways between the United States and Canada, peculiarly, just now, falling upon the latter country. Ten years, spent in numerous vocations in Canada, have naturally afforded the writer of this sketch opportunities for observation above the average.

Although timber and grain are the chief products of Canada, mining interests now assert themselves; material is there in plenty; capital and labour are needed to develop it.

It is no question, now, of royal alliances or delicate political adjustment. Fine feeling and cultured prowess in the field soon grow imbued with the common tarnish of smoke. Nations that have coal and iron, with sinew to the good, rule the world. In all these Canada is rich. Iron ore of high quality is, under various forms, found in almost all the provinces, though mining is yet in its infancy. Nova Scotia, perhaps, takes the lead, her furnaces having produced 20,000 tons of iron for a year recently elapsed. This old colony has long shared with New Brunswick the prestige that may accrue from being the greatest ship-building countries in the world, in proportion to their populations; so that the impetus which must be given to the iron maritime industries of the New Dominion's eastern sea-board by the development of mines

can scarcely be over-rated. Twenty years ago, the writer served an engineer's apprenticeship at the enormous establishment of Messrs. Charles Mare & Co., at Millwall. Day and night there arose the din of steam-hammers and the glare of furnaces, rendering visible dark hulls upon the stocks by the river's side. The "hands" were counted by the thousand. More yet; the entire bend of the Thames engirdling that dreary marsh known as the "Isle of Dogs" was aglow and at work. Most of those yards are closed now, their work "gone to the Clyde." The fierce spirit of competition presses Northern shipbuilders not a little. It needs but a less doubtful Colonial policy than now holds, when, Canada being formally confirmed in the advantages of imperial union, recognised as forming an inalienable part of the empire, men of the Clyde will establish branch industries in Nova Scotia.

In the province of Quebec, iron is even more plentiful, but mining has scarcely begun. The French natives have little energy and less wealth, so that an immigration of both capital and labour must aid the fusion of existing social elements which confederation must bring about.

Canadian iron-ore is, in the older districts, found together with marketable yellow-ochre, of dark-red colour when burned; sometimes as red hæmatite imbedded in crystalline limestone of Silurian formation. The joint produce of the three older provinces for a recent year was 40,000 tons, of which two-thirds were charcoal-iron, owing to the absence of coal from Ontario. It was not that railway communication was bad, but rather that timber for fuel purposes was so plentiful; year by year, however, wood grows more dear and coal more cheap. The "Steel Company of Canada" produced, according to official accounts, in the year 1876, 15,274 tons of iron, employing nearly 200 men. Charcoal was used as fuel, but is giving way to coke made on the premises. Charcoal pig-iron was shipped to England at the low freightage of $0·50 per ton.

British North America, Canada now, was first settled upon the coasts and along the margins of the lakes. It was long known that British Columbia had iron, but the strata containing it have only recently been localised to the "Cascade" region, beyond which it is not found. It is in contiguity to extensive coal deposits.

Coming from the Pacific coast across the Rocky Mountains, we find iron and lignite abundant between the Lakes Superior and Huron, as also in the district lying between the Georgian Bay and the Ottawa River. Further inland, altogether removed from the lakes, are coal-beds larger than any which are known elsewhere; there is at present, however, no communication with them either by land or by water. The completion of the Canadian Pacific Railway will open up the prairie-lands of the north-west, both to plough and pick-axe, rendering profitable the tracts of iron-stone reaching from the U.S. boundary-line to the Arctic Ocean itself.

Having glanced at the mines of Canada, and realised their undoubted importance in the future, some account of current iron-industries may interest. Vast in size as is Canada, the circle of actual manufacture falls necessarily within the limits of settled occupation. There, next to the mason, the blacksmith reigns supreme over the host of toilers, commanding steadiest wages; his harvest is gleaned from the peaceful cavalry of the country, the farmers and their teams of well-shod horses. In addition to this, ploughshares are breaking against stump and stone, reaper knife-guards becoming unriveted, while the maker of agricultural implements is not always within reach, so that Vulcan's sturdy son is "in clover" during harvest-season. Winter, again, sees him employed upon sleigh-runners, so that at no season is he idle.

Canadian blacksmiths evince ingenuity and quickness rather than muscular power, but there is many the wayside forge, in very remote districts, from beneath whose pent-house shed beams the honest, ruddy face of the English smith. Always glad to greet a countryman is he, and has stories to tell, leaning upon his sledge-hammer, of his distant hamlet in "Merrie England." Smiths' pay (journeymen's wages) ranges from $1·50 to $2·00 a day. "No very high rate, after all!" some one may cavil. No, but he lives cheaply and well; his children are well educated, and are worth money to him; and he has bought his house and "building lot." He may yet become Reeve or Mayor, or even expand into a robust, if not brilliant, member of Parliament.

No man, blacksmith or else, works for others, in Canada, longer than he need; independence is at once the charm and money-winning secret of that free life. The blacksmith is a pioneer rather than a follower; so much have times changed from the romantic cast of olden times, that he precedes the missionary, running a neck-and-neck race with even the zealous French Jesuit in the vanguard of civilisation. He builds his shanty, sets his forge agoing in charge of his boy, and himself, axe in hand, makes intermittent war upon the Titans of pine and oak.

Scarcely second to the blacksmith is the maker of agricultural implements: an important functionary in both civil and social circles. His profits are large, his work not particularly delicate, and he gives employment to many raw hands, who, thrown idle by the inclemency of the seasons, are ready to turn themselves to anything. In the smallest shop, however, one good mechanic, in the several branches of wood and iron, is retained at high wages. He feels himself at least as useful to the world as his master,—a bearing which, far from arousing bad feeling, wins esteem. If the "boss" have marriageable daughters, prospects of partnership improve.

Towering above the herd of lesser ones are some half-dozen notable makers, whose goods would, for lightness and finish, do credit to any country. Exigencies of Canadian farming, such as the shortness of harvest seasons and high price of labour, have borne colonial makers of agricultural machinery to a height in their profession, whence they look down with compassion upon "Old Country" rivals, with their cumbrous appliances. This is presumptuous; for the heavy clays of England demand diff-rent treatment from the light cleared soils of Canada; while, there, the extents of land only partially cleared of stumps suggest important modifications in ploughs and harrows. In Manitoba and much of the vast North-west territory, the soil is heavy and adhesive, so that steel ploughs can alone be used; parts, indeed, are made of glass, exceptionally. There are, as yet, no resident manufacturers there, although iron is plentiful, and some enterprising Englishman with a few hundreds of pounds is much wanted. Wire fencing would be sure to pay, for timber is expensive.

Reverting to "Old Canada," the inference, from what has been said, that machinery usurps hand-labour, is encouraged. Steam and horse-power play a far more active part than here. The scythe is used in places where machines cannot penetrate, it is true, and there are yet to be found settlers whose pride is their "cradling" prowess. Harvesting is dissociated from the rural and poetic surroundings that invest it at home. A sickle is viewed as a curiosity, and maidens are too busy making cheese to find time for weaving wreaths of corn-flowers, which, indeed, are less common than the terrible Canadian thistle. Another of those old implements that have, by association of ideas, become the subject of chaste apotheosis, is the flail. The horse-power thrashing-machine has dethroned it. Go where you will, during the months of July and August, you hear its humming. This, as well as the "root-cutter" and "reaper," is a dangerous machine, swelling the annual list of farm accidents. Smartly got up, they are christened by fancy names, such as the "Acme," the "Forest Queen," and the "Climax." Bright paint, however, does not always cover the best work. At the yearly provincial exhibitions, held in rotation at the various towns, makers are well represented; nor are their reputations merely local. Many have taken medals at European exhibitions. Giving work to both wood and iron workers, the opening of a factory is an event to a hamlet. Clustering around it are houses, library, town-hall, chapel, school, and surgery; the youthful town soon aspires to civic rights, this being the dearest hope of the Canadian corporate mind.

If machineries used to gather in the harvest be elaborate, those for the opening of new territory are simple. Most characteristic of Canadian implements are axe and "buck-saw." With the former, the pioneer fells trees, squares timbers, splits fencing: his axe is his capital. The other, disdained by backwoodsmen as a tool of effeminate luxury, is invaluable in the preparing of wood for the stove. There are professional travelling buck-sawers, often negroes, and the saw proves a source of livelihood for those who are, in the griping rigours of winter, so unfortunate as to lack work. Anybody in whom the consciousness of having enjoyed an academic education does not outweigh more solid considerations, may make tolerable wages by contracting with families to cut their "cord-wood."

The manufacture of saws and axes is naturally largely prosecuted, the Canadian axe being a model of elegance, and superior to English ones. Axe factories are sometimes very extensively built, arranged with small steam-hammers and shearing-machines, work being found for the clever blacksmith in welding the iron body of the blade with its steel-cutting edge. The "Galt Axe Factory" has a more than American celebrity, Australia being a heavy customer.

Among the necessaries of modern life, and high in the list of Canadian iron industries, is the sewing-machine. Though the largest factories are in the United States, Canada has many lesser ones: some of famous make. The "Osborn" and "Raymond" are at Guelph, Province of Ontario, forty-five miles from Toronto. The "Little Wanzer" is at Hamilton. Some years of piecework upon the "Osborn" enable the writer to estimate both the advantages and the defects of that system. Piecework to commence with, without any previous standard of day-labour, surely leads to exorbitant prices for work done. This was the case there. By the vigilance of employers, a "cutting-down" process was inaugurated by-and-by, which carried matters to the other extreme. There might, it is true, be worse luck than that of being obliged to work hard in order to make $10 per week, were it not that we had often to "lie off" a fortnight at a stretch, there being more stock on hand than could be at once sold. The work upon sewing-machines is of no great delicacy from the engineer's point of view, although a tact in adaptation is needed, only to be attained by practice.

Tool-making is the choicest mechanical department in the iron branches, nor can any but good blacksmiths hold their own, because of the precision demanded in tempering the many little cutting-tools employed.

Most money is made, however, not by the skilled mechanic, but by those for whom interest has secured a drilling or planing machine, or lathe. Either a pattern-shop is upon the premises, or woodworkers are employed at a distance, to make the boxes and tables. Machines are japanned also, so that an oven is needed, and the neighbouring foundry placed under contribution for "castings." Sales are chiefly effected through travellers and agents resident in the various towns of both continents; speculative canvassers frequently buy machines at reduced prices on their own account, finding their markets themselves. Capital being often scarce in the firm, this latter plan finds favour. Business being prosperous, ready money is coming in, while, the reverse happening, production is slackened, or the works even temporarily closed. The factories are modern, tastefully built, and well furnished with plant. Proprietors are mostly men from the United States, who, leaving their country to evade the excessive taxation consequent upon the Civil War, settled in Canada, where they grow attached to her, and make good citizens.

Canada has several high-class engine-shops. Messrs. Goldie & McCulloch, of Galt, Ontario, make engines quite equal to any of the English makes. The men are in bulk Scotch, for party-feeling runs high, and factories acquire the national *bouquet* of their owners. Famed throughout the Dominion, this firm has constant and reliable employment to give; the buildings are upon as large a scale as most engine-shops at home. Wood is used as fuel, yet signs are rife throughout the land of speedy change in the direction of coal. Upon such extensive railway lines as the Canadian, there are, of course, well-ordered locomotive shops. There is not so much "bright work" about Canadian as about English locomotive engines; still, essential parts are as carefully looked after as here. In Toronto and Montreal there are rolling-mills, with puddling-furnace and tilt-hammers, but nothing heavier than rails can be made. Boiler-plate is imported. "Pont-y-pool" is largely used. Good tool-making factories exist,—a recent direction taken by native enterprise; but, both pig and malleable iron being fetched into the country, prices of material and labour are high.

It must be long ere Canada exports finished material, but ores have been profitably exported already, if upon a small scale. Nova Scotia, Quebec, and Ontario sent out, in 1876,

60,000 tons. Canadian independence does not threaten at the moment; thoughtful Colonial minds desire closer alliance with the mother country. It is, however, a possible episode in the future, nor to be feared, except on broad Imperial grounds. England would not cease to be the market for raw mine produce. British capital is invested far deeper in the secondary applications of metals than in the primary one of ore extraction. The former will increase, the latter decrease, as the colonies unearth their treasures.

What may prove to be the character of those vast coal-beds underlying the prairie regions of the North-west must determine the future of Canadian manufactured iron. To cover small orders at special prices, charcoal-iron is unrivalled, but, to enter the stream of foreign competition upon equal terms, Canada must use coal. This is no place for the discussion of Transatlantic fuels. Suffice it, that the coals of Canada differ much in quality, and one extensive tract at least, — the "Smoky River," — is contaminated by the presence of sulphur, the ruin of reducing operations and forge-work.

The axe and saw excepted, cutlery is brought from England, together with the various articles of farm and home use falling under the generic heading of hardware,—all but a long list of small matters, at once useful and ingenious, such as locks, window-fastenings, apple-parers, in which line the astute Yankee is supreme. The foundry is an institution of deserved standing in Canada. It generally stands alone, unattached to an engine-shop. Few towns,—and Canadian towns would be villages in England,—but have such an industry, where rough castings are turned out to suit prices and occasions. Here resorts the shrewd patentee to put his pet scheme into shape, for the cost is not great, and the proprietors are sure to be interested in a "new wrinkle." At such a little foundry, the writer, having ordered a weekly relay of window-fasteners from his own pattern, fixed his base of operations for an extended canvassing tour. Partly on foot, partly by land and water conveyance, he traversed the greater part of a province, penetrating into the forest fastnesses of Muskoka, whose depths had never echoed to the pioneer's axe, nor a window existed to fasten. Lake upon lake, river upon river met his gaze, all connected and navigable, while a prescience whispered of a day when many factories and men shall be at work there making engines for the fleets of steam craft destined to plough those waters. The business of fastening windows growing unlucrative, he retraced his steps, making up for lost time in the hamlets fringing that new district.

Iron ship-building is practically confined to the maritime province of Nova Scotia, where coal is accessible; yet upon the chain of fresh-water seas stretching inland from the Upper St. Lawrence to the foot of the Rocky Mountains is "verge and room enough" for a large iron mercantile marine.

Docks will one day be found upon these prairie-reaches, and forests of chimney-stalks rise from the flowery sward, as nature yields her desolate sovereignty. But, at present, the feverish anxiety to "better themselves" that animates Canadians strikes at the roots of mechanical efficiency. Everybody covets the possession of land, and most attain their ends in time. There is not in all the Dominion a trained body of shipwrights able to build fleets; and if there were, the labour would be too costly. New Brunswick is, perhaps, foremost in engine-building: she burns wood-fuel, and therein is the secret.

A word now at the close. A small iron capitalist must do well in Canada, if only he can adapt himself to the exigencies of the country, beginning with repairs. Wire-fencing, corrugated iron buildings, mill-machinery, are needed. The intelligent mechanic with some means can also succeed, if he can unlearn his home-lesson and place expedition before excellence; let him join the two qualities, and it will be so much the better for him. Inability to raise himself out of the accustomed rut is what keeps back very many mechanics abroad. No man should resign good prospects at home in the vague hope of bettering his lot; for, as the world goes, he who gets good wages for a fair day's labour has cause to be thankful: as views widen responsibilities accumulate. If independence be easier gained, toil is far more severe than at home; perseverance and integrity make their marks in England.

A CHRISTMAS REVERIE.

TIRED and weary during a long journey, I sat ruminating in the corner of a railway carriage, when gradually a change seemed to creep over everything; my travelling companions had altered their attire; fashions strange and queer supplanted the homely garments of a few moments ago; the carriage seemed much loftier, the window had stopped its rattling, the draft from the ill-fitting door had ceased, a fresh pleasant atmosphere pervaded the place, although the windows were closed. A narrow table which occupied the space between the travellers was filled with books and papers all stamped with the seal of the railway company, and a Morocco-bound time-table, with the date 1900 in gold letters, lay amongst them.

I turned to my companion, with whom I had been in conversation a few moments before, and asked the meaning of all this. "Surely," said he, "you have not travelled much of late, or you would have known what improvements have been made." I suppose I looked somewhat puzzled, so he proceeded to enlighten me.

"You must know," said he, "that about Christmas time some fifteen years ago things had become so bad that a week of abstention from railway travelling was appointed, and offerings of fuel and water were made to King Steam, with prayers to relieve us from the difficulty. A strange thing then occurred. In the new year all the boards of directors, on assembling as usual, found their places occupied by shadowy forms. The bravest tried to take their usual seats, but were thrown with some violence on the floor and against the wall. One chairman, a gentleman of immense energy, fetched the police, but when the bâtons of those officials were wrenched from their hands, and recoiled with force on their own heads, the inspector said it was a private matter, with which he declined to interfere, and withdrew his men. Each of the directors went post-haste to his solicitor to consult him as to what had best be done, and the shadows remained masters of the situation. Writs were issued, but have not yet been served, although years have elapsed, and even now the energetic officers of the law may be seen entering every house where 'spirits' is written over the door in hopes of doing their duty.

Next morning the travelling world were sorely puzzled. On applying at the ticket-offices, the little iron grilles were closed. Travellers knocked and listened for the customary civil response. Silence reigned within. Outside the stations, in the windows of tobacconists, stationers, everywhere, placards met their gaze with 'Coupons 1900' legibly inscribed. Entering a shop our traveller asked for a ticket. 'We don't sell tickets,' said the shopman. 'We sell coupons.' 'I want a first-class return available for a week,' said our traveller. 'We have no classes,' said the shopman, 'and no returns, and all our coupons are available for a year.' 'Tell us all about it,' said the traveller. 'I will,' said the shopman. 'This little morocco case contains a book of coupons. Each leaf is perforated, and contains ten coupons, and each coupon enables you to travel ten miles, first-class. Each coupon is also divided into ten parts, and each part is equal to one mile, so that each leaf enables you to travel by any railway 100 miles, or any part of the distance, first-class. If you prefer to travel second-class, each coupon is available for twice that distance; and if third-class, three times the distance; so that only one kind of coupon is issued, available for any class. No season tickets are now issued, and excursion trains, which caused many accidents, are done away with. These coupons are available for a year. At the end of the year they must be exchanged for others of a similar value, dated for the year following. This is necessary for book-keeping purposes. A traveller, in presenting his book at the gate, has it stamped with the mark of the station he starts from, and the class he intends to travel, and the collector at the other end tears out the requisite number of tickets, and they go back to the clearing-house, where they are exchanged for cash.'—'How,' said the traveller, 'do you get your profit?'—'I will easily show you,' answered the shopman. 'Formerly a great discrepancy occurred in the cost of tickets. The first-class season-ticket holders often travelled at a rate below the third-class ordinary traveller. This was unfair. The cost of the booking-offices is now saved; the company get their money in advance. They do not sell less than 100*l.* worth of tickets, from which they allow us a discount. That discount is our profit; and the companies also reckon on a certain per-centage on coupons lost or accidentally destroyed, which they do not replace. People travel when, how, and as far as they like, and all pay the same rates. Large employers of labour keep tickets by them, and give them to their workmen when they send them to country jobs, and, in fact, the advantages are so great that no one will now propose to return to the old system.'"

I thanked my companion for his interesting communication, and we stopped at a station. The name was legibly written in twenty places on a level with the eye, and the whole length of the train. Every one, without looking out of the window and inquiring what station it was, could easily see. Porters came and civilly asked if we wanted to get out, or had any packages for them. They were a most intelligent-looking body of men; and on my remarking it to my informant, he explained that no paid porters were now employed. "It was found," he said, "not to work well to pay all men alike. The idle and disagreeable men did least work; the civil and industrious men did most; so that it became a premium on idleness, which was unfair. The present men are paid according to the work they do,—so much a package, if put on a cab, so much more if taken to your house. The signalmen and drivers are put in at twenty-five, and pensioned off at forty. They are very well paid during their fifteen years of active service, so that if they have been careful they can live very comfortably on what they have saved and the amount of their pension. If they desire further work, they have always the preference for light-porter's work, and are a very happy and respected body of men, and the companies have found the freedom from accidents this has brought about more than compensate for the extra cost."

I noticed a box with the word "complaints" written on it, affixed to the wall, provided with a lock. "That box," my informant said, "is for dropping your card with any complaint you may wish to make at the back. The travelling inspector has the key, and the advantage is the complaint is investigated on the spot, and often within a few hours after it is made. Your name is not divulged, and as complaints, as a rule, are not made without some cause, it has a most wholesome effect on all concerned,—so much so, that the knowledge of the facility it gives the public to bring their complaints before the proper authorities, prevents cause being given for them."

The floor of the carriage, I was pleased to see, was level with the platform, and no space was left between the platform and carriage. This had been urged so often, that I was glad to notice those appeals had at last been effective.

The carriages were also much loftier than any I had before seen, and my informant explained this great advantage was obtained at a small additional cost.

My companion also explained to me the use of a pipe about 3 in. in diameter, that passed under the carriage, and was connected with another upright pipe in each compartment, terminating near the roof, and provided with a valve just over the head of the passengers; an india-rubber junction between each carriage made it continuous. "This," he said, "is for the admission of air without draught into each compartment, and can be used at night, or in wet weather, when the windows are closed." At the back of the tender I saw a carriage, the front compartment of which was fitted with several bright copper vessels, of which I could not understand the use. "You will see by and by," said my friend, "but the box in the corner is an ice-box. In warm weather the air is carried round a coil of pipes inside the box, and is thereby cooled before it enters the carriages, and in the winter the box, which is made of strong riveted iron, is filled with steam from the engine, when the air is warmed, so that by this simple means, and at a nominal cost, the carriages are kept at a comfortable temperature, and the air sweet at all times." The insides of the carriages looked in good taste, and the cushions were covered with a pretty washing material. I noticed an absence of the bits of looking-glass and cheap gilt mouldings I had always associated with first-class carriages, and when I sat down the cloud of dust one is usually enveloped in was not to be seen.

The cause of the first improvement he explained was that the railway companies no longer trusted to their own efforts in decoration, but had instituted a yearly exhibition at which prizes were awarded for improvements in railway matters, and as those prizes were large, they were enabled to avail themselves of the best talent obtainable. The cleanness of the cushions was owing to the system of summer and winter fittings having been adopted; in the autumn all the carriages are cleaned out and washed, the cushions with their gay covers are taken out, and others with more sombre coverings substituted. The horsehair with which the cushions are filled is turned out and washed, as well as the cases containing it; by this means the stuffy mangy effect of the old carriages was removed, and the carriages always looked clean and inviting. I noticed there was no refreshment room at the station we had just left, and inquired the reason. "The directors," my friend explained, "became at last ashamed to sell their customers refreshments they would neither eat themselves nor offer to their friends." "And what have they substituted?" said I. "I will show you," said my friend; and, touching an electric bell I had not before noticed, the window was almost directly opened by a man dressed as a cook. After a few whispered sentences he withdrew, and returned in about fifteen minutes with a dish of cutlets and fried potatoes, most appetising and nice, which he handed in at the window with a bottle of claret and a decanter of water. I thought I had observed for some minutes a smell of cooking, but fancied I must be mistaken, although now I at once divined the cause, and I at once saw the meaning of the copper vessels which had so puzzled me. "Don't you think a little cooking-apparatus carried with each train is better than the old refreshment-room"? said my friend. "There can be no doubt about it," said I; "and I wonder it was not adopted before."

"Why," said I, "are the papers and periodicals all stamped with the railway stamp?" "They belong," said my friend, "to the railway company, and are provided for the use of travellers without charge; when done with they are sent to the hospitals. Why," he continued, "should hotel-proprietors provide their customers with reading free, and not railway companies?" "I cannot tell," said I. "Why is the time-table bound in morocco, and printed on such good paper? It is very nice, but to purchase it monthly must be very expensive." "It is not published monthly, but yearly," said my friend, "the monthly time-tables, owing to the constant changes and the difficulty of making arrangements in advance, became such a plague that they were abolished, to the loss of no one but the publisher, and to the gain of the whole travelling public. It is as easy for a company to make its arrangements twelve months in advance as one month, and we have now a well-bound well-printed book instead of the flimsy old time-table, always out of date, of years ago."

"Why are the carriages different colours?" I inquired. "To distinguish the class," said my friend. "When a train draws into a station it is annoying to travel all along the train looking for the class of carriage you require. It is better to be able to tell from where you stand where your carriage is. The smoking-carriages are all placed behind, so that the smoke cannot annoy any one whose window may be open."

"The carriages with lace curtains and upholstered so prettily are for ladies; you will see 'Ladies only' on the doors and windows, on the Continental system. You will notice they are first, second, and third class, to suit all wants, and are much appreciated."

"Where are the arms that used to divide the seats?" I asked. "They are done away with," said my friend; "they took up a certain amount of room, and when a compartment contains only four passengers, which is often the case, they can make themselves much more comfortable when there are no arms than when there are."

"You will notice," said my friend, "the windows do not rattle; the little crank at the side of the sash works up and down with a vertical motion like a French bolt, which is much better than the slovenly old strap and the loose sash. The door fits air-tight, like a jeweller's case. You will notice the keen draught that cut your knees in winter is done away with."

"Why," said I, "is the back cushion hung at top and the lower edge fixed to the seat, and why does the cushion draw out with a frame?" "This," said my friend, "is for long journeys and night travelling. By this simple contrivance, which only costs a trifle, each seat is converted into a couch, and by putting one-half the passengers it will hold into a carriage, which is quite as many as we usually have of a night, each traveller gets as much comfort as if he were lying on his couch. It is most gratifying after riding some hours to alter the position. This can now be done, and it is, I assure you, much appreciated."

"How pleasant it is to read by this electric light," said I. "Yes," said my friend, "it is generated by the engine, and costs little. How people put up with those dirty, miserable, old oil-lamps so long I cannot think."

"But where are the papers?" I asked. "Oh," was the response, "they are all journals now; news is condensed, sensation articles don't pay; advertisements are much dearer, so advertisers condense their matter; the public like it better, and the journals pay better than the papers, and they are handier and much better for keeping and reference."

"But how do all these improvements affect the dividends? I fear they must reduce them." "Not at all," said my fellow traveller. "People have not the objection they once had to travelling; you are as comfortable now in a railway carriage as in your own room. The number of travellers has very much increased, and the dividends are higher than ever in spite of the extra expenses. You will find," he added, "that whether a man directs a railway or keeps a shop, it is all the same, he never loses any thing by studying the comforts of his customers."

At this point the word "Tickets" was shouted in my ear, and starting up I found myself, with all my bones aching, put back twenty years into the old musty carriage, with its low ceiling, its rattling windows, its draughty doors, its stifling atmosphere, its wretched lights; and when the train stopped, and I was begging a stolid porter to have the kindness to put my luggage in a cab, I found to my cost, as the girls sing,—

"It was a dream, it was a dream."

W. H. Lascelles.

THE ORIGIN OF THE POINTED ARCH DISCOVERED.

More theories to explain the origin of pointed architecture! and this time so profound, so philosophical and unassailable, as to remind us of the immense advances in knowledge that we moderns have made, and the great elevation at which the nineteenth century stands as above all other centuries.

A book has been recently published in London, illustrative of some Arabian matters, and the author, in speaking of the camel, confers on that very venerable and useful beast a distinction which we are not aware it has hitherto enjoyed. In fact, he traces the origin of the pointed arch to the hump on the camel's back. The common camel, as every one knows, has two humps, but the Arabian camel, or dromedary, the chosen animal, only one. Architects should look up this, if only for "the fun of the thing." The volume in question is published under a *nom de plume*, but the real name of the author is understood to be Falkenbergh. If the conclusions of this gentleman are sound, the whole of our Gothic class-books, manuals, and glossaries will have to undergo a thorough revision, to make room for the "camel-back theory." About the antiquity of the "ship of the desert" there can be no mistake; for if the animal has not existed through all geological time, it is sufficient for all reasonable people to know that it was contemporary with Adam and Moses. Notices of the camel will be found in the Book of Genesis, and we know camels formed a considerable portion of the property of Job, who is said to have possessed 3,000 of these animals. Surely a domestication extending even over 4,000 or 5,000 years will satisfy reasonable folk that the hump on the camel's back must have well impressed itself on the minds of the early builders. Euclid, Thales, and others, who worked out such forms geometrically, were, doubtless, inspired by the hump. Echo says "Humph!" But *place aux dames*. Here we have a delicate *brochure* in lilac and gold which settles the matter entirely,—"Architecture and how it arose. With a Model for the Gothic,"* by Charlotte A. Pound. The illustration on the cover tells the whole story. Put the tips of three fingers on each hand together, separate the lower part of the hands as far as this will allow of, hold the two first fingers erect, to take the shape of pinnacles, and there you have it! What can be simpler or more conclusive? Not only the ground-plan, but the whole structure (says the writer) may be tested by the human figure as to its principles of symmetry and proportion; the Hand which forms the Arch is itself the perfect model for that Arch." And then the fair enthusiast goes on to teach how the proportions are to be obtained, in that sweet dogmatic tone which belongs to the sex when they happen to be talking of what they have no knowledge of. The braceletted arms of a lady upraised with the bent fingers touching, form an arch "which gives the altitude of the Chancel Arch and Roof, and distinctly defines the form." The hands are to suggest arches of every size, and will give the proportion for the window. The thickness of the wrist will determine the space between the windows for buttresses; and "the knee upraised to the height of the elbow, gives both altitude and form for the Entrance Porch." This last piece of information is too subtle for us, we are bound to confess, but it is evidently quite as true and useful as the rest, or as the statement immediately following that the feet side by side turned up show the relative size for the Great Door. Strange to say, all this is written as if with a conviction of its entire truth, and with a good sprinkling of Biblical quotations; the kind intention of the lady being, after "study of the laws of symmetry and proportion," to supply to modern architects the deficiency caused by the loss of the laws of Gothic architecture!

* London: Marlborough & Co. 1880.

THE JORDAN BAROMETER.

It is impossible to foresee the result of the perfecting of any scientific instrument. It is rarely the case that such an instrument is,—like the spiders among *insecta* and their allies,—born in the form which it will maintain through life. Such, however, was the case with the weather-glass of Pascal. The best mercurial barometers of the present day are in principle, and almost in detail, identical with the tube which that great genius carried up the Puy de Dôme for his memorable experiment. The great defect of the mercurial barometer is the narrow limit of its movement. A difference of ten per cent. in the atmospheric pressure, which is about the maximum to be obtained at any fixed point on the surface of the earth, only causes a difference of 3 in. in the height of the column of mercury, and it is difficult to read the barometer more closely than to the tenth of an inch. The ball-like, or cup-like, form of the top of the mercury gives some indication as to the actually upward or downward tendency of the barometric movement,—but the desirability of a more visible display of the force of atmospheric pressure is undeniable.

Extreme delicacy, no doubt, is obtained by the use of an aneroid, furnished with vernier and magnifying glass. But the aneroid is better suited for observations involving change of place than for those made successively on the same spot. Like the old-fashioned wheel barometer, the aneroid usually requires a tap, to see that the needle is freely moving; and this is but a clumsy means of making a delicate observation. Years ago we remember, in the window of an optician in Liverpool, an inclined barometer. The upper 3 in. or 4 in. of vertical tube were replaced by 5 ft. or 6 ft. of inclined tube, so that by placing the graduation at right angles to the latter, the intervals of change were magnified from twelve to fifteen times. We are not aware how the ingenious modification acted. Those of our readers who were at the meeting of the British Association in Birmingham some fourteen years ago may remember that one of the lions of the place was a water barometer, erected in the house of an amateur, which seemed almost to breathe like a living being. A water barometer was made by Professor Daniell for the Royal Society in 1830. The indications given by this instrument (the movement being about twelve times as great as that of the mercurial column) are very distinct. But the variation of temperature exerts such an influence on the vapour rising from the water within the tube as to interfere with the accuracy of the instrument. In fact, it is not a barometer, pure and simple, but a combination of barometer and thermometer.

Mr. Jordan, of the Museum of Practical Geology in Jermyn-street, has met, and it seems safe to say has overcome, this defect in the water barometer. He has substituted for water, pure glycerine, the specific gravity of which is 1·26, —or only one-fourth m re than that of water. And glycerine possesses the unusual advantage of combining perfect fluidity with a boiling point of 44° Fahr., and a correspondingly low freezing point. Thus, it raises no vapour to be affected by heat in the top of the tube, nor will it be injuriously affected by frost. The only defect of the substance is the readiness with which it absorbs water from the atmosphere. This has been met by Mr. Jordan by the ingenious device of giving the glycerine a waterproof coat, or, in other words, floating a layer of petroleum on the surface of the glycerine in the cistern. Thus, a barometer of extreme delicacy, and as little liable to get out of order as the mercurial barometer itself, has been placed at the service of science.

One of these barometers has been constructed at Kew Observatory; a second at the Museum of Practical Geology in Jermyn-street; a third at the South Kensington Museum; and a fourth at the office of the *Times* newspaper. This journal has commenced the publication of two hours' readings of the instrument, plotted on the natural scale. The unusual weather which has prevailed during the first week of these graphic indications has been illustrated by the very visible movement of the surface of the glycerine. What is now most to be desired is the erection of an adequate number of these instruments at certain well-selected points in the island, and the publication of the contemporaneous movements of the column. The strong accentuation of the variations already published is such as to raise the hope that much valuable information may be secured by the proper multiplication of these delicate observations.

ON SOME POINTS ARISING IN BUILDING CONTRACTS.

The case of Goodman *v.* Layborn, which we reported in our last number, p. 628, raised a question of some importance to those engaged in building contracts, as regards the extent of the clause relating to the power of the arbitrator over disputes as to extras or the plan or specification of the work. The clause, or rather part of it, there ran, "In case and as often as any dispute shall arise touching the plan or specification or the work mentioned in the second stipulation of this contract, it shall be determined by the architect, and his certificate thereon, and any and every other certificate given by him, shall be final and conclusive between all parties concerned, except only by his final certificate he may correct any error in any former certificate." It was argued before Mr. Justice Lopes, in chambers, unsuccessfully by the counsel for the employer, that this was a submission to arbitration within the 11th Section of the Common Law Procedure Act, 1854, and that that being so, all proceedings in the action could be stayed by the Court, and the dispute referred to the employer's architect. But the late Lord Chief Justice Cockburn, and Mr. Justice Bowen, before whom the appeal came, adopted the view taken by Mr. Justice Lopes, or rather, they decided the case on one of the grounds presented by Mr. Roscoe, the counsel for the plaintiff (the builder), that the architect was not an impartial person, and that, therefore, even assuming this clause to be a submission to arbitration, the Court would not exercise its discretion and stay the proceedings so as to refer it to him; and there can be little doubt that the Court took the proper and most desirable view of the question. When once a writ has been issued, and the parties have become antagonistic, it is obviously undesirable that the architect, who is the agent in many respects of the employer, should settle the disputes. It is perfectly certain that if he were invested with this power, the builder would not be satisfied if he did not recover all he asked for. If questions as to certificates arise, which are matters closely touching the manner in which the architect has discharged his professional duties, it is obviously unseemly that this very architect should have to settle questions in regard to certificates given, or not given, made properly or improperly, by himself. In the case of Goodman *v.* Layborn also, the application was made after the pleadings had closed, whilst the section of the Common Law Procedure Act states that the application is to be made before plea or answer. As the Lord Chief Justice pointed out, it is obvious that the party who desires to avail himself of a clause by which disputes are to be submitted to arbitration, and of the statute, should do so with expedition, and not let the case drag its slow length along through various stages of pleading.

Apart, however, from these what may be called preliminary though conclusive points, it seems pretty clear that the clause which we have quoted, and others of a like nature, are not submissions to arbitration which can induce the Court to stop legal proceedings, or which can be made a rule of Court under the seventeenth section of the Common Law Procedure Act, 1854. In the case of Wadsworth *v.* Smith (40 *Law Journal* Reports, Queen's Bench, p. 118, and "Roscoe's Digest of Building Cases," p. 8) it was decided that a very similar clause was not a submission to arbitration. The late Chief Justice of England, who was a party to the decision in question, said that the statute had only reference "to submissions by consent of the parties, and where it is intended that the matter shall be judicially inquired into and shall not be left to the uncontrolled decision of some third person." The essence of a submission to arbitration seems indeed to be as the Lord Chief Justice put it, that "the matter shall be *judicially* inquired into." Now it can hardly be that the decision of an architect as to whether 20*l.* or 30*l.* is to be paid for extras is a decision arrived at after a judicial inquiry. A judicial inquiry obviously means one in which both sides are to be heard, and which, though not necessarily very formal in character, yet should partake somewhat of the nature of a legal trial. Again, Mr. Justice Hannen remarked, "I think the clause in question is not a submission to arbitration, but only an expansion of the usual provision in building contracts that on the question of extras, &c., the certificate of the architect shall be conclusive." No doubt, the words in Goodman *v.* Layborn, "as often as any dispute shall arise," may give some countenance to the view that the architect was to be invested with the functions of an arbitrator, especially having regard to Lord Blackburn's words in Wadsworth *v.* Smith,—"Where it is intended that the referee shall determine some dispute, there his decision amounts to an award." But having regard to the general tenor of building contracts, no disputes in fact can arise about extras, nor could they, properly speaking, have arisen in Goodman *v.* Layborn, as the employer, when extras were charged for, had only to refer them for computation to the architect.

Another point in regard to building contracts arises upon a clause somewhat unusual in character, it is true, but which is found in some agreements. It is something to this effect, "that the payment of the balance does not free the contractor from any liability which he may justly be subject to." Suppose the building completed and payment made, some real or supposed defect is discovered several years after, and the employer thereupon commences an action for damages against the builder. We understand that, in the opinion of some contractors and builders, such a claim is an inequitable one. But there can be no doubt that if such a clause is placed in a building contract the house-owner may, with perfect legality, avail himself of it. As a matter of fact, as the case of Davis *v.* Hedges shows (L. R. 8 Q. B. 687, Roscoe's "Digest of Building Cases," p. 10), an employer may pay the full price for a building, may then find out that the work has not been efficiently done, and may then bring an action for damages without there being any such clause in the agreement, as we have mentioned above. So that, in fact, the introduction of such a clause is only to formulate and put into so many words a legal right which, in any case, exists. But it is perfectly clear that an employer who commences an action for damages against a builder for bad work or bad materials, some considerable time after the building is completed, would have to show, with great clearness and certainty, that what he complains of really and proximately arises from these causes, and not from others which do not concern the builder at all. Clearly, therefore, builders have nothing to be alarmed at in such a clause as the one now under discussion, and it is most desirable that they should not be under the impression that by receiving payment they are quit of all responsibility in connexion with the building which they have erected. Some short explanatory observations, and the essence of the case we have mentioned, will be found in Roscoe's "Digest of Building Cases" (p. 10), where a portion of the French Code Civil is also given, showing that in France architects and contractors are liable for ten years from the completion of the work for any faults in plan or construction. If there is any false impression as to the effect of payment, the sooner all builders and contractors learn by heart the case of Davis *v.* Hedges the better. If they are dissatisfied with their present legal position, the only course open to them is to insert in contracts some kind of statute of limitation, such as is the law of the land in France, though for a shorter period. But, considering the keenness of modern competition, it is more than doubtful if the public would employ builders who insisted on such a clause.

ST. LEONARD'S TOWER, WEST MALLING.

Sir,—Mr. Parker's remarks upon St. Leonard's Tower at Malling, printed in the *Times*, and more recently in the *Builder*, induce me to send you the following notes taken eight or ten years ago during a visit to Malling, and which may interest some of your readers.

This tower, apparently the earliest built and the latest part remaining of the residence of Bishop Gundulf, is probably one of the first Norman keeps, perhaps one of the earliest military towers in masons' work, after the departure of the Romans, constructed in England. With these pretensions, it deserves more attention than it has hitherto met with.

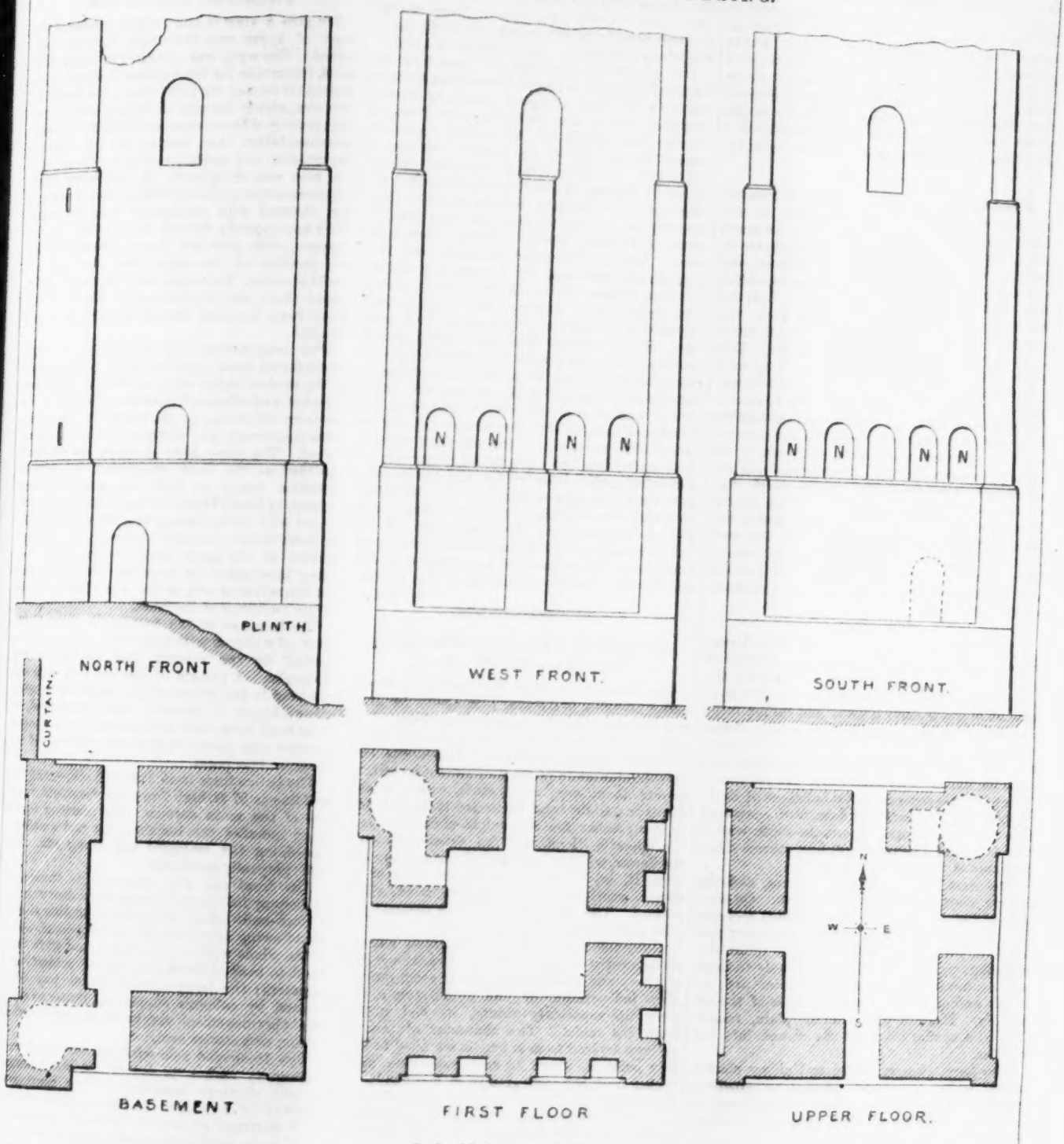
It stands about a quarter of a mile south-west of the parish church of Town, or West, Malling, in Kent, the plain heavy tower of which is also attributed to the bishop; and a little further from the remains of the religious house founded by the same skilful and magnificent prelate, and a remaining part of which seems also to have been his actual work.

The tower stands upon a ledge of horizontally-bedded sandstone rock, of a friable character, which juts out from and forms the east side of a short narrow combe, the defence of the castle on its western front, and which opens upon a stream tributary to the Medway, which stream receives a further addition from a spring which rises from beneath the rock about 100 yards south of the tower, and has been employed to strengthen the defences of the place on that side.

The tower is a very plain rectangular structure of the Early Norman type, about 32 ft. square at its base, and about 60 ft. high on its northern and eastern, and about 70 ft. on the two other faces, the difference being produced by the greater depth of the rocky shelf. The walls rise from a plain plinth, the top of which is at the ground level on the east face and north-east angle, and 10 ft. above the level on the south and west, so that the plinth is on these sides 10 ft. high. The tower is flanked at the end of each face by a pilaster strip, which rises from the plinth, and each adjacent pair meet and cover the contained angle. At three of the angles these strips have 6 in. projection, and are 3 ft. 6 in. wide, reduced by two sets off to 2 ft. 6 in. at the base of the parapet, into which they probably died. The pilasters covering the fourth, or north-east angle, are 7 ft. broad, and of 18 in. projection. These also have two sets-off. This increased breadth and projection is to accommodate a turnpike-stair, which rises from the base to the roof, and was evidently crowned by a square turret, but whether there were turrets at the other angles is doubtful, though, if present, they must have been of rather smaller dimensions. In the centre of the west face is another pilaster, 3 ft. broad, and of 6 in. projection. This also rises from the plinth; but stops at the level of the uppermost floor, at the base of a window, of which it forms the cill. Of the sets-off, that at the level of the first floor is carried round the tower; the upper one is confined to the pilasters. The parapet is gone, and the wall at the head of the staircase, being weakened by it, is somewhat broken down. The tower wall is described as battering, or inclining inwards; if so, the degree must be very slight, for its appearance is vertical, the set-off reducing it by about 6 in. or 8 in., so that at the summit the dimensions cannot be less than 30 ft. square, and the wall appears, from below, to be about 6 ft. thick.

The basement is without windows, but in the south face, near the east end, was a round-headed doorway, quite plain, without a portcullis or any moulding, and of about 3 ft. 6 in.

ST. LEONARD'S TOWER, WEST MALLING.



Scale, 16 *ft. to an Inch.*

opening. This is now, and evidently has long been, walled up, so that any rebate it may contain for the door is concealed. It opened on the top of the rock, and probably was approached by a wooden exterior stair, which must have been 10 ft. high. The present entrance is opposite to it at the same level, which there is that of the ground. This seems to have been a later opening, broken where the wall was reduced in thickness by a sort of lobby at the foot of the staircase. This is a very common treatment with Norman keeps, the ordinary doorway becoming inconvenient, and the times ceasing to demand extraordinary precaution.

The first floor has a plain round-headed flat-sided opening, that is, without splay or what in the North is called flanning, placed in the centre of the north, south, and east faces. On the south face this window is in the centre of a plain arcade, having on each side of it two similar arches, about 3 ft. broad and 2 ft. deep. The singular thing is that these niches are in the outer face of the wall, not, as would seem natural, and as occurs at Chepstow, in the inner face. In the west wall are four similar niches, but the central space is solid, occupied by the pilaster. There are two narrow round-headed loops on the north face, lighting the staircase at two levels.

The second and upper floor has four windows, one in each face. These are round-headed, quite plain, flat-sided, of about 4 ft. opening and 8 ft. high to the springing. The three floors seem to be,—the basement, 15 ft. high; the first or main floor, 30 ft.; and the upper floor, 15 ft. The floors were all of timber. There is no visible fireplace, nor do there seem to be any mural chambers or galleries. The walls at the base are 8 ft. thick. The staircase communicated with each floor, and with the roof. The line of the lower floor cut off the head of the original entrance doorway, as at Chepstow.

The masonry throughout is of a very sound and solid, though of a rude description. It is evidently original, and does not appear ever to have been repaired or even pointed. It is of rubble, the stones being pretty much as they came from the quarry, of all shapes, but rarely containing more than a foot cube. The work is roughly but decidedly coursed, with a slight tendency to the herring-bone pattern. The joints are very open, and the mortar has been very freely used. The quoins and window-dressings are of ashlar, apparently of some local ragstone, with wide joints.

It is difficult to form any safe conclusion as to the plan or area of the castle, of which this tower was certainly the keep. No doubt it lay to the north-east and east, where the ground forms a table-land a little above the keep level, and where there are traces of some rather extensive earthworks. There is a short piece of curtain-wall projecting a few yards from the south-east angle of the keep, and pointing eastwards. It looks of early masonry, but of rather later date than the keep, against which it is built without bond. It is about 25 ft. high. According to this evidence the south and west faces, at the least, must have been exterior, which, considering the arcades on their faces, and the position of the entrance-door, is curious. Probably the other end of the curtain abutted upon the north-east angle, but if so it did not bond, and has been destroyed, leaving no trace of its presence. This keep stands in three separate premises, two of which are, or rather were when these notes were taken, jealously closed. The only entrance is by the modern

door, which was fastened and the key judiciously mislaid; nor, at that time, was there a ladder to be found within reach of the tower. The garden, containing the earthworks, and within which probably stood the hall and lodgings, was attached to a private lunatic asylum. It is much to be desired that the Kent Archæological Society should take this tower in hand, and obtain proper plans and elevations of so very remarkable a building, with a good photograph of its masonry.

THE CHURCH TOWER.

A furlong or so from the castle is the parish church, the western tower of which is also attributed to Bishop Gundulf. This is a square, solid, heavy structure, about one diameter in height, very plain and simple, and without any ornament or set-off. The two western angles are capped with pilaster strips, which rise, not as usual from a plinth, but direct from the ground. There is a third pilaster, of much bolder projection, at the south-east angle. This stops short of the summit, and is mixed up with a buttress, apparently of Decorated date, and connected with an early south aisle, now removed. There is a west door, of late insertion, and above it a window, probably representing an original opening. The walls are thick, and there is an opening into the church. The tower stairs are of timber, as are the floors. In the south wall of the basement chamber is a small round-headed window, the exterior loop of which has been altered and made square-headed. The wall is rubble work, coursed and very open jointed. Though rough, it is rather superior to that of the castle, probably from respect to the character of the structure.

THE ABBEY.

The Abbey, or Nunnery, a Benedictine House, also founded by Gundulf, is about a quarter of a mile from the parish church, and just on the verge of the town. The remains are not considerable, and include a good and rather large Perpendicular gatehouse, with an earlier chapel attached. The west part of the church is standing, and the south wall, and a building connected with the south transept, probably the refectory. There are also some domestic buildings of Early English and Perpendicular date, now converted into a dwelling-house. These, the south wall of the nave, and the refectory, form three sides, probably of the cloister court.

The west front is mainly Norman, and the lowest stage is of very early work. On each side of the door are two round-headed recesses like those on the keep, and the character and material both of the rubble wall and the ashlar dressings correspond sufficiently closely to those of that tower. Of a similar character are the south wall of the nave and the walls of the refectory. There is also a small, plain, round-headed door that led from the church into the cloister.

The keep, church tower, and abbey church afford, within a narrow compass, an excellent study of Early Norman masonry, unaltered, or altered only by the effects of time and weather. All are to be attributed to Gundulf.

Gundulf was a native of the Vescin, and educated at Rouen. While there he visited the Holy Land, and must have had ample opportunity during his absence of studying Roman military works. On his return he became a monk of Bec, and was thence transferred to Duke William's newly-founded abbey of St. Stephen, at Caen. He was well known to Lanfranc, and, no doubt, to the Duke, for he was sent for to England, and in 1077 consecrated Bishop of Rochester. His first architectural work in England was, no less than the keep, known from the first as the "Tower," of London, and built probably in 1077–8. His next care would probably be his own cathedral, which he rebuilt, and of which a part of the west front is considered to be his work. He founded Malling Abbey about 1090, and it seems to have been completed or consecrated about 1106, and no doubt during these sixteen years he also built his castle. In the reign of William Rufus that king consented to his building a castle at Rochester, "*quia in opere cæmentarii plurimum sciens et efficax erat castrum sibi Hrofense lapideum de suo construeret.*" It cost him 60*l*. Where this keep stood is not known. It could scarcely have been the tower bearing Gundulf's name, and no doubt his work, attached to the north transept of the cathedral, for a tower so strong and so placed would, in the hands of the king, be more than inconvenient to the church, and it certainly was not the great and noble keep, of late Norman work, which rises so majestically between the cathedral and the Medway. Possibly this was the successor to the Gundulf tower, which, however, could scarcely have been in decay, though it might have been inconveniently small for so important a position. Gundulf died in 1108.

Mr. Parker is justified in regarding St. Leonard's Tower as one of the earliest Norman keeps in England, though I incline to think it probable that it was built when the Tower of London was completed. So narrow a question cannot be decided by the internal evidence of the work. I incline also to the belief that no keeps in Normandy are of earlier date than the reign of Duke William, though whether there are not one or two there earlier than his conquest of England has not, I think, been made clear. Arques, one of the earliest known, is a magnificent structure, for a beginning, and so, for that matter, is the London keep. Grand earthworks, lofty mounds, and deep and repeated ditches exist in abundance in both countries, of far earlier date than the eleventh century; but these were intended to be supplemented, and were, for at least two centuries, supplemented, not by works in masonry, but in timber, and certainly the shell keeps which are found in connexion with these features are never earlier than the close of the eleventh century, if so early; but the rectangular keeps were of somewhat earlier introduction, and the problem as to their first appearance can only be solved by a very close examination of those that remain both in England and Normandy, and of the square Roman towers in the south of France, by some person possessing the knowledge of detail, and the vast English experience of Mr. Parker.

G. T. C.

DECORATIVE SUGGESTIONS FROM NATURAL FORMS.—No. 7.

THE natural specimen sketched here, *Masdevallia Lindenii*, is a flower remarkable for grace and elegance, in the symmetrical form of its long narrow leaves, which have a great resemblance to some common forms in Greek ornament, and the manner in which the flower rises up from among them on its tall stalk, which usually displays a slight bend backward in its rise, as if to compensate for the weight of the flowers in the opposite direction. The peculiar design of the flower, with the long tendril curving upwards from it, or, in a less developed state of the flower, overlying it in a sinuous bend, will be noticed. The flower is of a very delicate purplish tint, with a bright yellow tip.

Many things might be done in decoration with so suggestive a type. One point in the growth of the plant is, that the leaves seem remarkably independent of the flower-stem; they grow up separately around it, and it rises from the midst. The character of the two designs derived from it here is intended to keep this point in view: in each case long stems spring from between groups of leaf-forms. In the patera, which is intended as painted porcelain, the three portions of the design are grouped in relation to the three portions of the surface: the leaves cover the flat centre, the stems run round the curve or hollow leading up to the rim, and the flowers decorate the rim. The other design is intended for very light and delicate wrought-iron work arranged between standards—such work as might be used for a chancel-screen, or in some similar position. The tendril springing from the base of the flower is in this case twisted into small spirals, the treatment most suited to the character of the material.

LIVERPOOL ARCHITECTURAL SOCIETY.

THE second ordinary meeting of the thirty-third session was held at the Royal Institution, Colquitt-street, on the evening of November 3, the president, Mr. C. Aldridge, F.R.I.B.A., being in the chair. There was a good attendance, and the paper of the evening, entitled "Two Faces under a Hood; or, Hypocriticism in Art," was read by Mr. Joseph Boult. A discussion ensued upon the merits and demerits of the Queen Anne style of architecture, in which Messrs. J. F. Doyle, Wm. Parslow, Joseph Boult, and the President took part.

Previously to the ordinary meeting, a meeting of the Class of Design and Construction was held in the small library, under the guidance of Mr. C. E. Deacon and Mr. J. F. Doyle, when thirteen sets of designs for a sideboard were handed in. The second meeting of this class was held on November 17th, when Mr. C. Aldridge, F.R.I.B.A., delivered the first of a series of lectures on Construction, the subjects being, the Local Building Acts; choice of site, soil, aspect, and levels; excavation and concrete.

MESSRS. CHILD'S NEW BANKING PREMISES, TEMPLE BAR.

WE give a view in our present number of the front of these new buildings, recently completed. The work was executed in three divisions, to provide for the banking business being carried on during the rebuilding; the first division comprising the rear buildings, and containing a portion of the strong rooms and the servants' accommodation, thus leaving the old banking department and residence standing for use until the new was completed. A temporary banking-room constructed in Child's-place, of quartering, covered with corrugated iron, the whole lined and specially framed to meet its intended purpose, was provided for occupation during the erection of the main front and the new banking-room. The latter has now been occupied about three months, the upper stories of the front main building having since been nearly finished.

The arrangement of the entire buildings necessitated great care to avoid infringements of the ancient lights with which the site is surrounded, and schemes for the improvement of the property adjoining, to the south and east, have been considered, and definite agreements negotiated. The plans have also been considerably modified as the work progressed, the original intention being to light the whole building (except in front) from two large internal courts, (faced with white glazed bricks) and to enter in front from a central doorway, the eastern portion of the main front building not then being proposed to be used for bank purposes; but the whole extent of the site is now devoted to the buildings of the bank.

The frontage of the building is about 73 ft., 50 ft. of which is within the City boundary, now defined by the western face of Temple Bar Memorial. A portion of the old City wall was removed in the course of the excavations, when other objects of interest were discovered, as have been from time to time noted in our pages, as were also particulars of the widening of the street at this point.

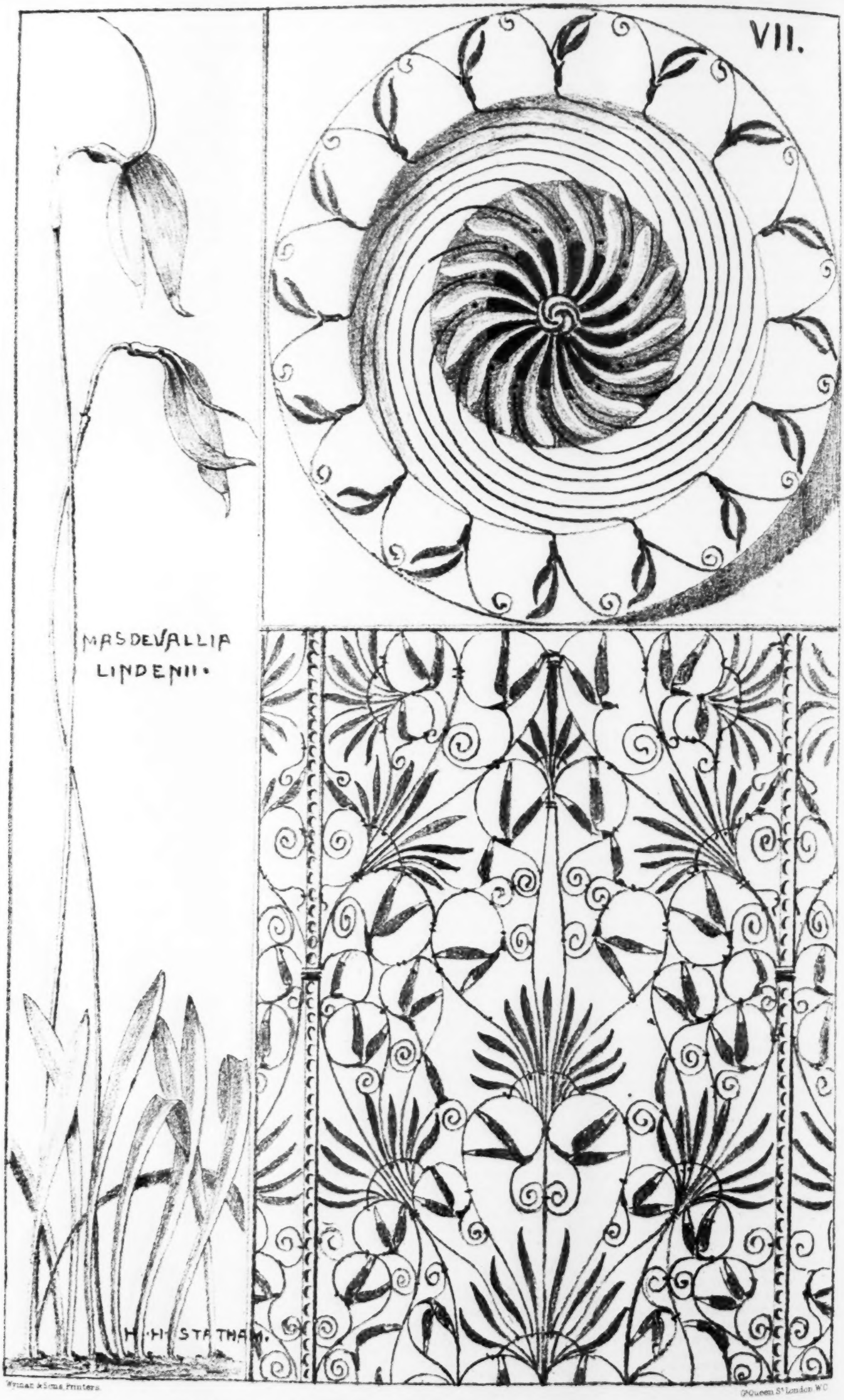
The entire front is of Portland stone, and the building is 57 ft. high from the pavement to the top of the main cornice. The carving to the front includes the bank's arms and emblems, combining the marigold and rising sun. The roofs generally are slated.

The front and only entrance is through a mahogany folding and swing-fitted doorway into a stone-built lobby, and through another similar set of swing doors into the banking-room, which is the whole width of the front, and 48 ft. from front to back, divided into bays by columns and pilasters; the large central square bay being formed by columns supporting beams to carry the superincumbent weight of the brick-arched ceiling and stories over.

The front and side windows are fitted with mahogany sashes protected by iron balance-weight shutters externally. The heating is effected by two open fireplaces, supplemented by a thorough system of hot-water piping and coils, and a sunburner partly supplies the artificial light and necessary ventilation, for which latter purpose extracting-flues are also provided.

At the back of the banking-room are fanlights, and a specially constructed ceiling light, amply lighting this spacious and lofty room, the fittings of which are specially designed and framed of picked mahogany. The gas-lighting is further provided for by standards, in some cases specially adapted to suit the desk arrangements. In the rear of the bank are the partners' three rooms, accessible from each other, and the principal staircase adjoins; these and the other principal rooms throughout are fitted entirely in wainscot oak. The ledger, chest, lift, and other strong rooms are very large, lofty, and spacious, solidly constructed and groined, in fireproof materials, rising from central columns, which latter were found in the excavations, and fitted with iron doors, gates, and other appliances by the best makers. The iron shelving is also constructed to design. A special feature in these rooms is that they are lighted through glazed grilles of wrought iron, and protected internally by massive iron shutters. Dining-rooms for the partners and clerks are also provided, on the ground-floor, with the requisite service arrangements, the building from front to back extending a distance of about 150 ft.

The basement is further devoted to very extensive groined strong-rooms and voucher-



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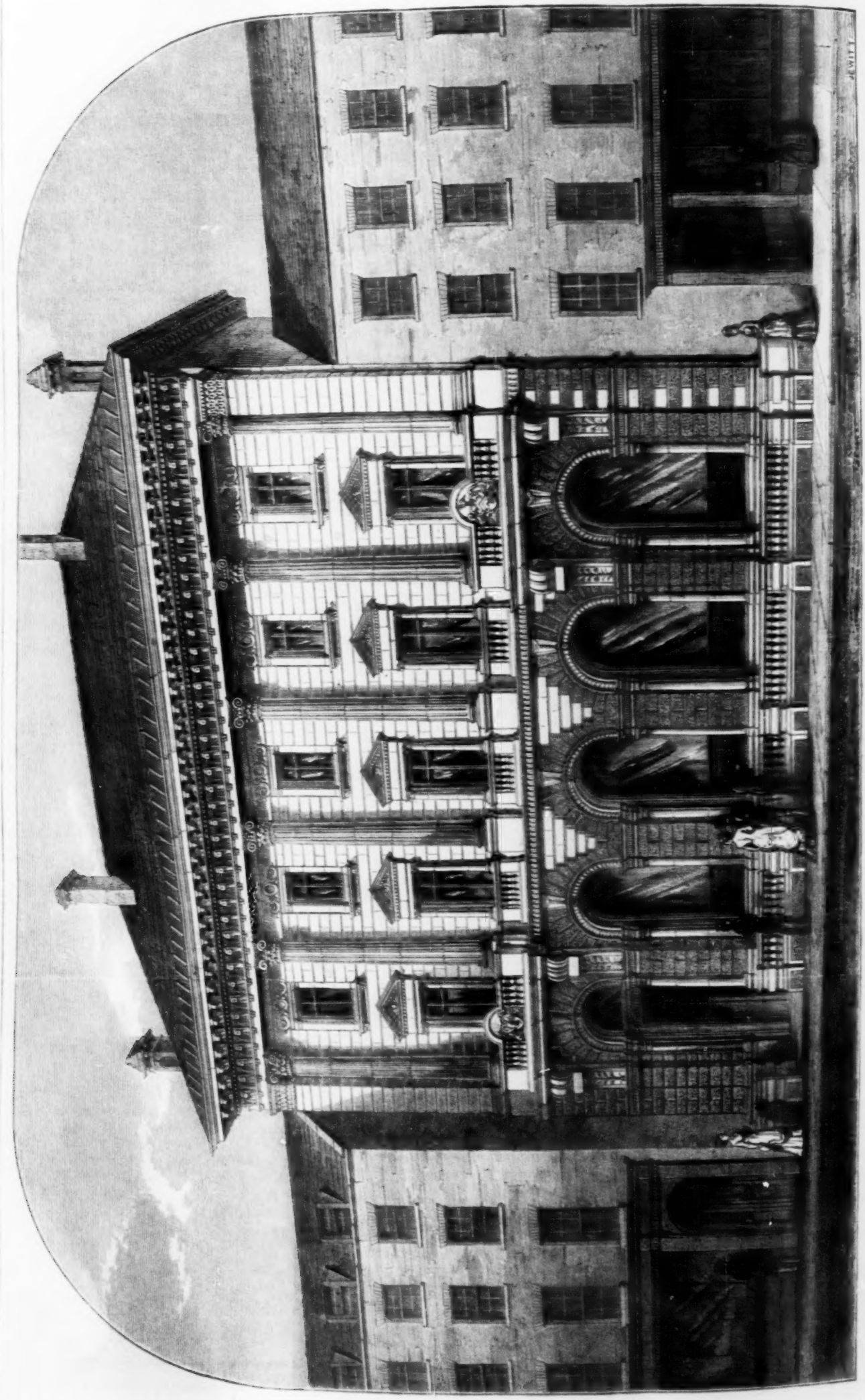
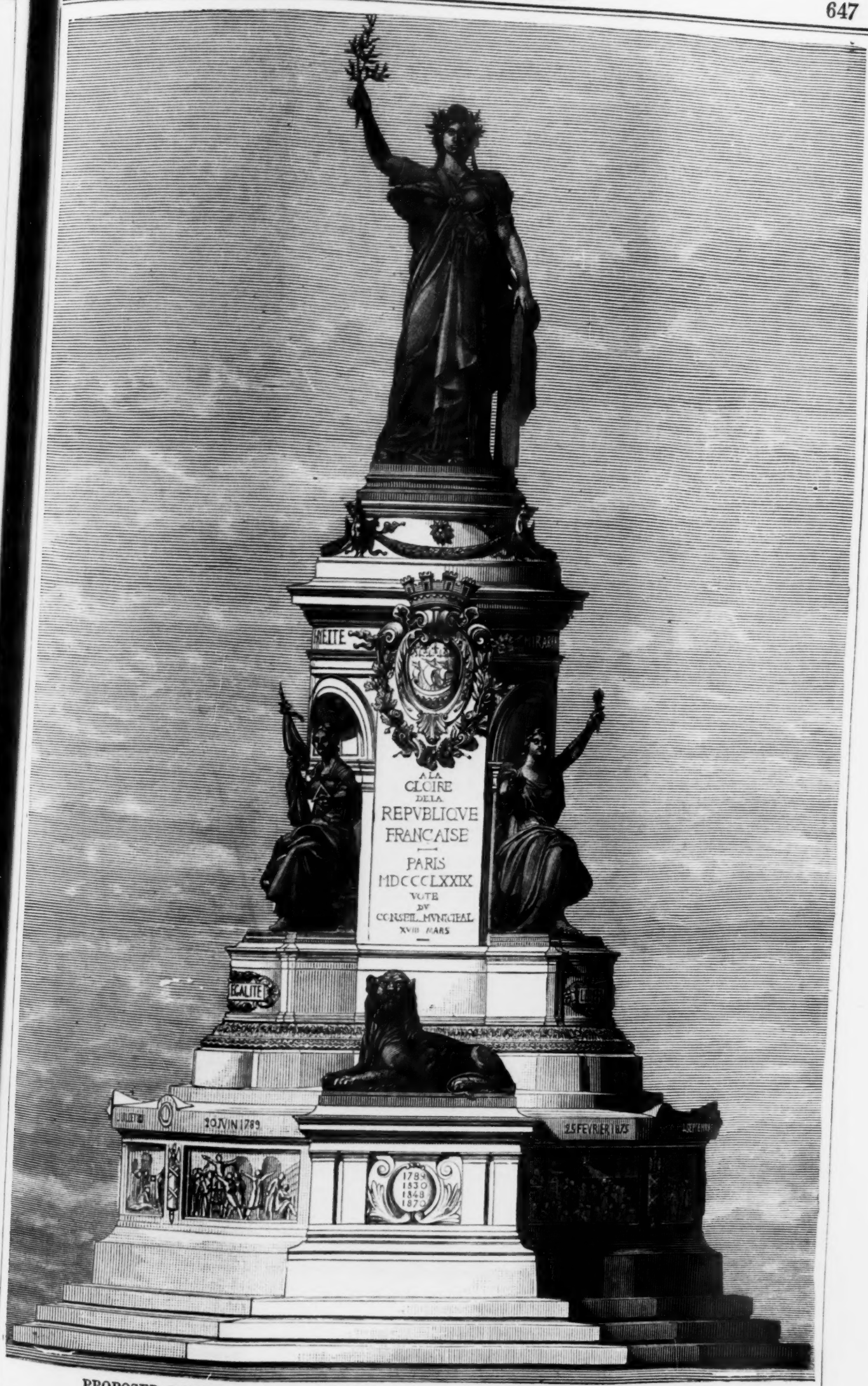


CHILD'S BANKING HOUSE, FLEET STREET.—Mr. John Gibson, Architect.



PROPOSED MONUMENT IN COMMEMORATION OF THE FRENCH REPUBLIC, PARIS.

Chancel of S. Swithin's Church, Lincoln. Jas. Fowler F.R.I.B.A. Architect

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rooms, clerks' lavatory accommodation, kitchen service, and cellarage, the latter extending under the whole of Child's-place.

The large central front room on the first floor is furnished with dado and book-cases, &c., to design, and this and the other front rooms on this floor will be occupied as sitting-rooms by the residents, for whose accommodation, on the first, second, and third floors, a large number of bedrooms, with other rooms, are provided. An electric bell service is fitted throughout, also appliances in case of fire.

The works have been principally carried out by Messrs. George Smith & Co., contractors, from the designs and directions of Mr. John Gibson, architect, of Westminster. The proportions of the front are very agreeable, and the work throughout displays the same knowledge of detail that distinguishes other works by the same architect. Some account of the banking firm, which is the oldest in London, has been given in another volume of the *Builder*.

MONUMENT IN COMMEMORATION OF THE FRENCH REPUBLIC, PARIS.

Among the new monuments about to be erected in Paris is one intended for the adornment of the "Place de la République" in place of the fountain Château d'Eau, which has been cleared away. On the occasion of the late July *fêtes* a model of the new design in plaster was set up on the selected site, and of this we give an engraving. The sculpture is the work of M. Leopold Morice; the architecture, of M. Charles Morice.

ST. SWITHIN'S, LINCOLN.

The first stone of the new church of St. Swithin, Lincoln, was laid on Easter Monday, March 29, 1869, by the Bishop of the diocese. The nave and aisle only were built at that time, and the building remained in that condition until a little more than a year ago, when the first stone of the chancel was laid by Mr. N. Clayton. That addition to the edifice being completed, on Easter Monday last it was consecrated.

The Bishop on that occasion pointed out that the following churches have been built, rebuilt, restored, or enlarged between the two dates named, namely,—the Training School Chapel, new; St. Peter's-in-Eastgate, rebuilt; St. Paul's-in-the-Bail, rebuilt; St. Michael-on-Mount, beautified; St. Martin's, rebuilt; St. Peter's-at-Arches, restored and beautified; St. Mary's-le-Wigford, restored and enlarged; St. Swithin's, new church; St. Mark's, rebuilt; St. Andrew's church, new; and St. Botolph's, enlarged; while the church of St. Mary Magdalene is about to be restored. The sum of 9,000*l.* has already been expended on St. Swithin's Church, and about 5,000*l.* more is required to complete the design.

The new chancel is about 40 ft. long, 24 ft. wide, and two bays in length, each bay containing a three-light window, with wheel-tracery in the head. The east window is a very fine one, with five lights. Externally the bays are divided by buttresses, the double buttresses at the angles being surmounted by lofty pinnacles, and with the crocketed gables form a handsome termination to the church.

On the north of the chancel is a large organ-chamber, with a commodious vestry attached. The roof is polygonal-shaped, turreted and panelled, with a timber arch marking out the eastern bay. A stone sedilia, handsomely carved, occupies the south side of the sanctuary, while the northern side has an arch opening to the organ-chamber, with a doorway to the vestry. The chancel is raised above the nave by three steps, and has a panelled wall surmounted by light iron railing, with gates in the central opening. The stalls and prayer-desks are of carved oak. The cost of the alterations just completed is about 2,500*l.* The architect is Mr. James Fowler, of Louth; and the builder is Mr. C. Baines, of Newark. The east window is the gift of Mr. J. Shuttleworth, in memory of his late wife. The interior of this church has an air of quiet dignity which elicits many expressions of satisfaction.

The Photophone.—Professor Graham Bell has promised to read a paper before the Society of Arts upon his "Photophone," at the ordinary meeting on Wednesday, December 1.

THE USE OF CEMENTS.*

There is probably no more deeply-rooted conviction prevalent among architects than the belief we cherish in the excellence of Roman mortar. The Romans distinguished themselves among all the conquering nations of antiquity as mighty builders, and throughout every country which they subdued we find the remains of public works and buildings, more or less perfect, as evidences of their occupation and monuments of the skill and enterprise of their architects. The builders of Rome undoubtedly made use of the limestones of the countries in which they worked, and sometimes they came across good limes of a cementitious character, and at others they found only fat or rich limes. In the former case we find the structures which have escaped destruction at the hands of man still extant; in the latter, where the mortar was made of bad or unsuitable lime, the buildings have crumbled away and have become obliterated by natural causes. The secret of the excellence of Roman mortar, so often and so laboriously sought after, is to a great extent a delusion, and we praise the mortar of the ancients only because all the bad mortar has long since perished. It is nevertheless a fact that we owe indirectly to the Romans the discovery of all our modern cements, for it was in consequence of researches made respecting the durability of ancient mortars that the reason for what has been termed the hydraulicity of limes was explained early in the present century. To our own countryman, Smeaton, the builder of the Eddystone Lighthouse, and to Vicat and others on the Continent, must be assigned their due share of credit for these discoveries; and their labours have since been ably supplemented by the investigation of Pasley, John, Fuchs, and Pettenköfer. I will not occupy your time with more than a brief record of the gradual growth of our knowledge concerning cements, and I propose only to glance at the history of these materials, which is one of much interest. I wish rather to treat of the employment of cements for practical purposes, and to invite your attention to a brief consideration of the manner in which we have availed ourselves of the knowledge we have acquired concerning cements and cement action. I must first dwell for a few moments, however, upon the use of mortar in London in times past, because my argument will involve a clear appreciation of this part of the subject. After the Great Fire in 1666, London, as we all know, sprang up, by royal enactment, as a brick city, and the quaint wooden buildings which had been the characteristics of the London of the past, were no longer recognised by the new Building Act, and were condemned, as they still are, by the district surveyors. There must at once have been a great demand for lime, and the quarries adjacent to the metropolis were placed, no doubt, under heavy contributions for the necessary materials. The chalk nearest to London, on the banks of the estuary of the Thames, and north and south,—at Watford and Croydon,—is the white, flint-bearing, or, as geologists term it, "the upper chalk,"—one which yields a fat, pure lime, having little or no cementitious properties, and furnishing, therefore, a mortar of the worst possible kind. Further away,—on the banks of the Medway, and on the chalk ranges of Dorking and Guildford, or northwards, in various parts of Buckinghamshire,—we find the grey chalk, a totally different substance, and one capable of yielding a lime of good quality. But it is impossible to examine the mortar of two hundred years ago without being convinced that it was white lime which our ancestors prized, and mixed with the smallest possible quantity of sand. The mortar of those days speedily dried, or obtained a false set, owing to the absorption of the water by the porous bricks, but it never became truly indurated, and, after all these years, it is found in the joints of many an old house in the City as a mere crumbling cake, which can be crushed into dust between the finger and thumb, and has no cohesive strength whatever. Just listen to what General Treussart says concerning this kind of lime: "Thus chalk-lime mortar, when wet, is a pulp or paste, and when dry it is little better than dust." No wonder at the clouds of fine powder which half-blind us when any work of demolition is in progress in the older parts of London; the only strange thing is that the brickwork holds together so long as it does.

It seems somewhat astonishing in these days of rapid building to read the specifications of even one hundred years ago only, and to learn the amount of labour then bestowed upon the preparation of even such mortar as this. Let me read you a passage from the "Builders' Price-book" of Batty Langley for the year of grace 1748. Speaking of what he terms "terrice mortar," probably trass, as he says terrice is a kind of sand brought from Holland, he tells us "the best terrice mortar is made with two bushels, &c., of hot lime, and one bushel, &c., of terrice, well incorporated by beating, and which quantity to beat well is a good day's work for a labourer." Think of this, poor overworked larryman, three bushels of mortar per diem "a good day's work"!

It was, I think, out of no disrespect for the white chalk lime, but rather from some strange belief in the colour of the grey lime, that about the middle of the last century a fondness arose in London for what was called stone lime, such as that of Dorking or Merstham,—that is, a lime of stone-colour,—for I can see no other reason for calling this chalk lime a stone lime, which it certainly is not. It was a fallacy dating back to the time of Vitruvius, that the harder or denser the stone from which the lime was burned, the harder the mortar made from it would eventually become. Smeaton was, perhaps, the first engineer to demonstrate this to be a mistake. So strongly was the truth of this fact believed in, however, that some have thought that an opportunity was taken of this error, to introdude the Surrey and Medway limes, under false plumes, by terming them stone-limes, to convey the impression that they had been burned from limestone rock; indeed, Smeaton tells us such was the case. My own opinion is that certain grey limes had gained the reputation of being strong limes, that is, capable of uniting large volumes of sand, and that it was the colour which gave the name, in this instance, of stone lime.

Pasley says, respecting this commonly-received opinion of the strength of grey lime, "We found by repeated experiments at Chatham that one cubic foot of Halling lime (very similar to that of Dorking) weighed nearly the same when fresh from the kiln; and by the gradual addition of water, that it dilated to the same increased bulk in the state of quicklime powder; but, when worked up into mortar not too short for use, that it would not bear quite so large a proportion of sand as the common chalk lime had done: this experiment leading to a result in opposition to the common opinion amongst the builders in the metropolis, which is that the Dorking and Halling limes, as being stronger (limes), will, when made into mortar, bear more sand than common chalk lime."

We may assume that this rise of the grey lime in public favour was partly due also to the increased facilities of carriage, by means of which the better limes were able to compete with the fat limes, which had been hitherto more readily obtained around London. Whatever may have been the reason for this preference, practical builders doubtless soon found that the grey chalk lime yielded a far better mortar and would set harder with more sand than that made from the white chalk and pure lime; but "Dorking stone lime" continues to this day a favourite piece of specification idiom.

The natural cement stones of the neighbourhood of London were discovered by Dr. Parker, and specified for cement-making by Messrs. Wyatt & Parker, in 1796. They patented the mode of making what was called Roman cement, by means of calcining the septaria or masses of nodular limestone found in the London clay. In course of time it became known that very similar results could be obtained by combining mixtures of clay and lime or chalk mechanically, and artificial cements, such as those of Vicat and Pasley, became largely employed. This manufacture paved the way for Aspdin, with his Portland cement, patented in 1824, but it was not until 1847, or thereabouts, that the manufacture of Portland cement was perfected, and that what we now regard as Portland cement was made use of upon any scale.

I have said thus much on the history in order that I may prepare the way for my inquiry into our mode of using these cements, and glance at the extent to which they have supplanted lime. This may enable us perhaps to ascertain the causes of our failure, and properly to appreciate

* A Paper read before the Architectural Association on the 19th inst. by Mr. Gilbert R. Redgrave, as elsewhere mentioned.

the advantages we should gain from the more extended use of cements.

I am going to maintain that in good Portland cement we possess the best building material of the day, infinitely better than half the rubbish we make our houses of or pave our streets with, and a hundred-fold better when used as mortar than the compound we still go on specifying, as if we knew no more than our grandfathers of the properties of limes and cement. I trust I am not heretical in these matters, but I am so firmly convinced that lime, as now employed, will shortly become obsolete, or nearly so, as a building material, that I am able to speak out boldly in favour of cements. This brings me to my subject,—the use, or, rather, the uses, of cements; for we are almost daily adding to our store of knowledge concerning the numerous constructive purposes for which cements may be made available.

Before going further, I wish to be clearly understood in respect to the meaning of the term "cement." By the word "cement," as it is new used in building, a substance is implied which, when treated with water, will set or indurate without change of form. Limes of every variety show more or less energy to change their physical condition when water is poured over them. Pure limes, such as those made from Carrara marble or white chalk, instantly unite with the water or become hydrated, expand to two or three times their bulk, develop intense heat, and fall to a powder. Very hydraulic limes, under the influence of water, show at first hardly any sign of action. They are termed by builders very "dead," and only after the lapse of hours, or even days, crumble into coarse, gritty fragments. Such limes, if ground or mechanically reduced to an impalpable powder, may solidify without heat or apparent expansion, and acquire a set of the same nature as Portland cement. These limes are true natural cements. Between the active pure limes and the natural cements are an infinity of hydraulic or partially hydraulic limes, some of which, namely, those of a dangerous type, will at first set under water, which is what the term "hydraulic" really implies, or in air, and gradually fall to pieces; while others, on the contrary, will at first crumble to a fine powder, which powder, however, on being worked up with more water, will set, after the manner of cement. Limes of this kind are termed by Vicat "intermediate limes," as they partake of the character both of limes and cements, and are intermediate in their action between the two. The eminently hydraulic limes of the lias formation, which are ground and sold as "lias cements," are natural cements of the former class; while all argillaceous limes, which will go abroad when treated with water, and subsequently set when made up with sand, belong to the latter class.

It may be useful here to point out that Portland cement (which is one of the very highest quality when properly made) sometimes, owing to defects in its manufacture, presents more the characteristics of an intermediate lime than those of a true cement. Thus it may, from imperfect calcination, faulty proportions, or undue admixture of the ingredients, blow and fall to pieces, after having become set, or it may crumble and fail to acquire cohesion when mixed with water; or, lastly, it may set so slowly as to be scarcely capable of being used for cementitious purposes at all. Portland cement, in fact, although the manufacture has now been brought to great perfection, is not wholly free from fluctuations in composition, which, in former times, brought great discredit upon the material, and which during the early days of its employment, caused it to suffer by contrast even with Roman cement.

The next consideration is the cause of cement action, that is, the explanation of the facts I have just been describing. Why do some limes swell up and fall to pieces when treated with water, while others remain wholly inert? The cause of hydraulicity was, to a certain extent, explained by Smeaton, who found by exposing the Aberthaw lime to the action of acid, that he obtained a residue of clay, and that all good "water-limes" examined by him left this sort of residue, while the pure limes, which were devoid of hydraulic properties, were entirely dissolved. He therefore rightly attributed this peculiar action to the presence of the clay. In his own words, he says, "In burning and falling down into a powder of a buff-coloured tinge, and in containing a considerable quantity of clay, I have found all water-limes to agree." Smeaton, who owned that he was no chemist, does not appear to have known the true reason for this action. It remained to Saussure to announce that this property depended solely upon the presence of the clay, while Descotils, in the year 1813, pointed out that the cause of the phenomenon was due to the presence of a large quantity of silicious matter, disseminated in very fine particles throughout the texture of the mineral. The chemistry of the action of cements and the formation of silicates in the kiln, which silicates become hydrated and rearrange themselves in consequence of the difference of their affinities, in the presence of the water, was first thoroughly explained by John, and the theory was perfected by Fuchs, of Munich. The study of this branch of the subject is one of great interest, and those who wish to pursue it further may do so by consulting the essay on lime in Knapp's "Technology."

It is strange that, although this action is in the main a chemical one, it can be greatly influenced by purely physical causes. To illustrate this, I will quote a recent and curious experiment of Dr. Knapp's in the laboratory at Brunswick. The avidity of quick-lime for water is one of the strongest we know of, and the rapidity of the combination of the lime causes so much warmth to be evolved that the particles are immediately raised to a red heat. Conflagrations, we know, often occur from what is termed the slaking of lime. Now, if quick-lime be reduced to powder in a pestle and mortar, and this powder be tightly rammed into a hollow cylinder perforated with minute holes, and fitted with screw caps to close the ends; on placing this lime cylinder in water, the moisture can only reach the enclosed quicklime very gradually and in very small quantities; the result is, that instead of slaking to a powder, the lime becomes converted by its hydration into a very hard and solid mass, as different as can well be imagined from ordinary slaked lime. Here a well-known chemical action is changed by purely physical means. Some chemists have thought that in the case of mixtures of lime and silicates, that is, in those limes which are more or less hydraulic, the particles of quicklime being coated over with an envelope of silicious matter, the water is only permitted to approach the lime very gradually, as was the case in the cylinder experiment I have described, and this theory has also been put forward by a German chemist to explain the reason for the peculiar action of General Scott's cement, or selenitic cement, as it is termed. I am afraid I am devoting more time than you will care for to these chemical questions, but I think they will enable us to appreciate better the action of cements. To sum up briefly the foregoing facts,—Pure limes, which after falling into a powder are made up into a paste and mixed with sand, yield mortars which have no inherent setting power, and can only become indurated by the slow and gradual recombination with carbonic acid. This re-formation of the carbonate can only proceed where atmospheric air, or water charged with carbonic acid gas, can penetrate, and the centres of thick walls, even after centuries, are often found with the mortar still in the state of putty, as when first used. Cements, on the contrary, owe but little to the atmosphere; indeed, true cements indurate better beneath the water than in the air. They possess in themselves the power of solidifying or becoming indurated, and attain their greatest strength in a few years at the most. It is a question which can scarcely be said to have been finally settled how long cements continue to harden; indeed, cements vary so much in this respect that the time differs in almost every sample, according to the composition and the degree of firing. Cements of the Roman type stand at one end of this scale, for many of them attain their full degree of hardness or tensile strength in from twenty to thirty days; while dense, well-made Portland cement of the highest quality would seem, from Mr. Grant's experiments, to continue to improve for seven years, and constitutes the other extreme of the scale.

In speaking of cements, I have purposely avoided all mention of that class of substances which, when added to rich or fat limes, impart to them hydraulic properties. These materials are puzzuolana, trass, arenes or volcanic sand, and many kinds of calcined argillaceous earth. There can be little doubt that all these substances owe their influence on mortars to the soluble silica contained in them. By soluble silica, I mean that variety of silicic acid which when treated with acids will gelatinise. Silica when heated to bright redness in the presence of bases acquires this soluble form, and most calcined clays, and volcanic minerals, which have been exposed to high temperatures, are more or less rich in gelatinous silica. Mortars compounded with pure lime and a sufficient quantity of substances capable of converting them into cements become, for the purpose of the arguments I am anxious to place before you, equivalent to cement mortars. Unfortunately, however, these mortars are rarely employed, except by engineers for docks, foundations, and other similar purposes, where the solvent action of water is dreaded. Occasionally, when, owing to the difficulty of obtaining good sand, the builder employs with fat limes burnt ballast or broken bricks, which are artificial puzzuolana, a mortar which sets surprisingly hard is obtained. Such good mortars are, however, exceptional, and their excellence is due only to the action of the "aggregate," and not in any way to the quality of the lime.

I now return to my subject, and propose to place before you the arguments in favour of employing cements instead of limes for mortar-making. First, cements will unite much larger quantities of sand and building materials into a homogeneous mass than limes, and they are therefore more economical to use than limes. I am sure that the plea of economy is one of the very strongest arguments of the present day, and therefore, though this is not my best plea, I introduce it first. Rather than take the price-book values of lime, cement, and sand, and with them construct an imaginary set of tables to show how the prices would work out, I will avail myself on the present occasion of the admirable series of experiments recorded by Mr. Colson in a paper presented to the Institution of Civil Engineers in 1878, in which this subject is most fully and ably dealt with. I am the more tempted to place before you Mr. Colson's figures, because he has with the painstaking care and accuracy which mark all his observations, not only given us the cost of different mortars, but also the actual strength of each of the various mixtures. His experiments will be all the more interesting, I think too, because the paper containing them was not read and discussed at a meeting, but formed one of the selected papers, published in Vol. 54 of the Proceedings of the Institution of Civil Engineers. It has, therefore, hitherto, not attracted that share of attention from architects and engineers which the importance of the subject demands. I will convey to you Mr. Colson's observations as far as possible in his own words.

"The object of these experiments," he tells us, "was to ascertain what proportion of Portland cement and sand would produce a mortar equal in strength to, and as convenient to work as, grey lime mortar, mixed in the proportions ordinarily adopted for constructive purposes." I may here observe that the difficulty in the use of cement mortars with large quantities of sand is their want of plasticity, and it is necessary to contrive means to overcome this, or the workman will not employ them, except in a very liquid, and therefore very objectionable condition. This tendency to shortness can be obviated by introducing chalk, lime-dust, loam, or other substances which produce a fat unctuous paste when treated with water, but all these materials tend to weaken the mortar. Still, it has been found, from careful experiments, that within certain limits it is possible to introduce even clay (which is, perhaps, the cheapest diluent which can be obtained) without reducing to any very serious extent the tensile strength of the mortar. The following series of experiments is very interesting, bearing as it does directly upon this point. The mortar was, we are told, in each case mixed to a workable consistency, equal, in fact, to the condition in which it could be used in the work. Mr. Colson's testing was carried out by means of briquettes, similar to those used in ascertaining the strength of Portland cement, having a neck of 1½ in. square, equal to a sectional area of 2¼ square inches. The mortars remained in the moulds until sufficiently hard to admit of removal. At the expiration of six months the blocks were tested for tensile strength, the results being shown in the first table. Mr. Colson says, respecting the samples of common lime mortar, that "the induration or chemical set had penetrated only to the extent of ½ in. to $\frac{5}{16}$ in.; but, in the majority of instances, only ¼ in. The remainder of the area of the fracture had only dried, and could be

TABLE I.—*Comparative Strength of Grey Lime and Portland Cement Mortars; also Portland Cement Mortar with the addition of Lime and Loam.*

No.	Number of Tests.	Proportions. Sand.	Cement.	Lime.	Water.	Breaking strain on 2·25 square inches in lb.	Breaking strain per square inch in lb.	Ratio compared with lime mortar.	Ratio as compared with cement mortar.	Remarks.
1	17	2·00	—	1·00	1·33	61·06	27·13	—	—	Three samples of Grey lime. Water includes that required for slaking lime.
2	27	2·00	—	1·00	1·33	106·07	47·09	—	—	
3	27	2·00	—	1·00	1·33	82·00	36·44	—	—	
1	15	6·00	1·00	—	1·25	233·53	103·79	2·81 to 1	—	Cement taken from bulk in store.
2	20	8·00	1·00	—	1·66	154·80	68·80	1·86 to 1	—	
3	35	10·00	1·00	—	2·00	112·88	50·16	1·36 to 1	—	
1	70	6·00	1·00	0·50	1·50	165·31	73·47	2·00 to 1	0·70 to 1	Water includes that required for slaking the lime.
2	74	8·00	1·00	0·66	2·00	132·62	58·94	1·60 to 1	0·85 to 1	
3	85	10·00	1·00	0·83	2·50	95·27	42·34	1·14 to 1	0·84 to 1	
				Loam.						
1	21	6·00	1·00	0·50	1·00	136·80	60·80	1·64 to 1	0·58 to 1	Yellow loam, fresh dug and rather damp.
2	25	8·00	1·00	0·66	1·33	86·48	38·43	1·04 to 1	0·55 to 1	
3	19	10·00	1·00	0·83	2·00	64·50	28·66	0·77 to 1	0·57 to 1	

TABLE II.—*Statement of Approximate Cost of Mortars.*

DESCRIPTION.	Proportions in cubic yards. Portland cement at 45s. 6d. per cubic yard.	Grey lime at 14s. 6d. per cubic yard.	Loam at 2s. 8d. per cubic yard.	Sand at 2s. 8d. per cubic yard.	Cost of material.	Cost of labour and water.	Total cost.	Produce of mortar in cubic yards.	Cost per cubic yard.
					s.	s.	s.	cu. yds.	s.
Grey lime mortar	—	1·00	—	2·00	20·00	6·62	26·62	2·25	11·83
Portland cement mortar No. 1	1·00	—	—	6·00	62·19	6·84	68·23	5·90	11·56
Portland cement mortar No. 2	1·00	—	—	8·00	67·69	7·80	75·49	7·60	9·93
Portland cement mortar No. 3	1·00	—	—	10·00	73·19	9·57	82·76	9·30	8·88
Portland cement and lime mortar No. 1	1·00	0·50	—	6·00	69·44	8·68	78·12	6·40	12·20
Portland cement and lime mortar No. 2	1·00	0·66	—	8·00	77·27	11·20	88·46	8·25	10·72
Portland cement and lime mortar No. 3	1·00	0·83	—	10·00	85·22	13·78	99·00	10·15	9·75
Portland cement and loam mortar No. 1.	1·00	—	0·50	6·00	63·56	6·23	69·79	6·10	11·44
Portland cement and loam mortar No. 2	1·00	—	0·66	8·00	69·53	8·05	77·58	7·90	9·82
Portland cement and loam mortar No. 3	1·00	—	0.83	10·00	75·47	9·97	85·44	9·75	8·76

crushed in the hand without any great exertion of force." The cement mortar with six, eight, and ten parts of sand, was, we are told, of "such a raw, harsh character, that it would be practically impossible to use it in a satisfactory manner. In order, therefore, to render it somewhat more convenient for working, a small quantity of lime or yellow loam was added, thus rendering the mortar more plastic and tenacious."

"The result of further experiments shows that the addition of lime and loam reduces the initial strength of cement-mortar considerably, the reduction due to the addition of loam being more marked than by the addition of lime. The quantity of unslaked lime or loam, viz., one-twelfth the bulk of the sand, was found to be as small a proportion as could be used to give the necessary tenacity."

Mr. Colson tells us that the experiments made with these mortars in brick joints "were not altogether satisfactory, inasmuch as the appliances at hand were not sufficiently accurate and delicate to justify a ratio of comparison. It may, however, be stated that the general result went to prove that the adhesive power of mortar mixed in the proportions of eight of sand to one of cement, with the addition of loam, was superior to grey lime mortar mixed in the proportion of two of sand to one of lime."

The second table shows the comparative cost of these different descriptions of mortar. As Mr. Colson points out, "such estimates must be received with caution, because difference of locality would exert a great influence upon the cost of production. The following statement is a close approximation of the cost of the several descriptions of mortar, the charge for labour and water, and also the bulk of mortar produced, being in each case the mean result of experiments."

The second argument in favour of using cement in lieu of lime is that cement possesses an inherent chemical set, or power of induration, whereas fat limes can only become indurated either by the slow and gradual influence of the carbonic acid contained in the atmosphere, or in consequence of the materials mixed with it to make the mortar. I have already, in the earlier part of this paper, dealt with the setting power of cements and the re-carbonation of limes. But it may be as well to glance at the facts again, to see what they imply. Cement mortar has everything necessary in itself, in whatever position it may be placed, to become hard: all that it requires is a reasonable amount of moisture. In the centre of walls, in trenches and foundations, and even under water, the induration of cement compounds proceeds steadily, until in due time the mass acquires the hardness of stone. Lime mortar, when fat limes are used, soon gets a thin skin of carbonate formed at the surface and joints, and the very formation of this exterior skin or coating at once presents a formidable obstacle to the induration of the lower or interior layers of the mortar. These merely dry into a crumbling porous powder, with little or no strength, and which, if the air cannot reach them, are no harder in 100 years than in a twelvemonth. Alberti states that he had seen lime in an old ditch that had been abandoned about 200 years "which was still so moist, well-tempered, and ripe, that not honey, or the marrow of animals, could be more so." What a contrast to this is presented by the fact that a week or two back, while a barge at some works upon which I am engaged in Staffordshire was being unloaded, a sack of Portland cement fell into the water: it could not be fished up for a day or two, but when recovered it had become converted into a stone-like mass moulded to the exact form of the sack.

Perhaps I shall be reminded that mortar joints are not by any means generally such worthless affairs as cement advocates are wont to describe them, and that even when white chalk lime or mountain limestone is used, the crystallisation of the hydrate of lime round the particles of sand presents the appearance of some slight induration. I will grant that such is to a certain extent the case, but I believe it will more often be found that this trifling amount of induration is due to the sand employed in forming the mortar. Lime has the power of slowly attacking silica, even in the form of quartz, and most sands present other bases favourable to the formation of compound silicates. We thus get in very old mortars a small percentage of silicate of lime, which can only be accounted for by some such action as this. Of course, when the lime is presented with a sufficient quantity of a substance of the nature of pozzuolana to enable it to form silicates in the work, we obtain a cement action differing but little from what would result from the use of true cements. Some writers seem to have thought that it might be cheaper, and more generally convenient, to form the cement in the work by compounding a mortar of a fat lime with the requisite quantity of calcined silicious clay; but this plan, after having been tried on the Continent, has been abandoned in favour of the mode patented by Vicat and St. Leger of making an artificial hydraulic lime from a mixture of chalk and clay. This manufacture is still carried on upon a considerable scale round Paris, at Issy and Meudon, and the use of pure lime, so vigorously denounced by Vicat, has since his time been to a great extent abandoned (at any rate, upon public works) in France. It cannot be said that here in England we have taken to heart the lessons we have learned, and the unscientific use of lime burned from the hard limestones of the North of England, and from the white chalk in our southern and eastern counties, still continues unchecked.

A third reason for employing cements in preference to limes is that a method has been discovered by General Scott by which limes can be converted into cements by a very simple process, and at a very moderate cost. Perhaps you will allow me to glance briefly at this invention, as it is one imperfectly understood. About twenty-five years ago General (then Captain) Scott, of the Royal Engineers, found that a sample of grey lime, burnt in a common fireplace, with a smothered fire, had acquired properties very different from those of the same lime if prepared in a clear bright fire. He at first thought that this peculiar result was due to the formation of a sub-carbonate of lime, owing to the imperfect combustion of the fuel, but subsequent experiments caused him to abandon this view, and to adopt the theory, which he ultimately found to be the correct one, that the change in the character of the lime was due to the presence of sulphur which had been absorbed from the ashes of the coal. This fact led to the invention of what was called Scott's cement, a material which was prepared as follows:—Tender-burnt grey chalk lime, made from a lower chalk, containing from 10 to 15 per cent. of silica and alumina (as, for instance, that of Lewes, in Sussex, or Burham, on the Medway), was re-heated to bright redness in shallow kilns or ovens, having perforated floors or hearths. When the lime was sufficiently hot, pots of sulphur were placed beneath the floors, and this sulphur was at once set fire to by the heat of the kilns. The fumes of the burning sulphur thus rose around the lime, and a coating of sulphate of lime was formed over each of the lumps. The lime was then ground between mill-stones, and Scott's cement ready for use was obtained. As it appeared that this cement owed its peculiar properties to very minute quantities of sulphate of lime, intimately mixed with it, General Scott thought it might be possible to prepare it in a cheaper way, as, for instance, by sprinkling lump lime with sulphuric acid, or mixing ground lime with plaster of Paris; but though each of these plans was tried most carefully, it was found to be impossible to secure uniformity by any other than the gaseous method before described. Many years later, during the building of the 1871 Exhibition, General Scott found that if the selenitic lime, however prepared, were first ground in a mortar-mill to a creamy paste, and the sand then added, a very good cement action was secured, and he made a selenitic cement, as he has termed it, from a careful mixture of ground hydraulic lime and sulphate of lime. This cement, if used as

directed by General Scott, will bind together six parts of sand into an extremely hard mortar, and will make a good concrete with nine parts of ballast. My argument in favour of the use of cements is therefore greatly strengthened by my being able to point to such a material as selenitic cement.

The question of the kind of sand to be employed hardly enters into my present subject. I may mention, however, that in using cements, in order to secure their utmost strength, clean sand is eminently necessary. Sharp large-grained sand makes better work than fine sand, and there seems scarcely any objection to clean sea-sand, except that for internal plastering it is liable to become damp on changes in the weather, as the salt absorbs moisture. Salt sand makes stronger cement-mortar than pit or river sand, provided all are equally clean.

I wish, in conclusion, to say a few words about the use of cement in concrete. In this direction I am convinced that hitherto very little has been accomplished, and we plod on here in London with bad bricks and bad mortar, as if there was no escape from a thoroughly vicious system of building, which ought to have been abandoned with the building of the Tower of Babel. Concrete-making and the numerous uses of cement concrete is a subject in itself for a long paper, and I can only point to a few directions in which the applications of concrete appear to deserve attention. I am disposed to affirm,—at any rate, I will do so for the purposes of argument,—that as London, from its peculiar position, is and must continue a brick city, we ought, with our present knowledge of the properties of cements, to make our bricks much smaller, to serve as mere "aggregates," or, what would be better still, we should calcine our brick-earth in heaps, as ballast is made, and unite this burnt clay into monolithic structures with Portland cement. I cannot perceive any legitimate argument in favour of selling under-burned, mis-shapen, discoloured lumps of calcined clay at so much per thousand, in order to enable builders to charge 14*l.* and upwards per rod for sticking them together into walls. Far better would it be to burn the bricks into clinkers, and then incorporate the fragments of them into solid homogeneous structures with good cement, at less than two-thirds the cost of brickwork. I sincerely hope I may live to see the day when bricks will be discarded, and I trust that the New Zealanders, when they explore the ruins of London, may find it necessary to dig very deep down into the *débris* before they find any "genuine, sound, square, hard-burned stock-bricks" for the ceramic museums of the future. The days are past when the colour of cements must ever be thrown in our teeth as a reproach. Mr. Lascelles has shown the possibility of so colouring Portland cement as to render it scarcely distinguishable from red brick or terra cotta, and the house he sent to the Paris Exhibition, designed by Mr. Norman Shaw, formed a new departure in concrete building. Mr. Lascelles is able to prepare mouldings and dressings in this material at a less cost than the same work in cut bricks or terra-cotta. In point of natural colour, selenitic cement, which is a warm buff, leaves little to be desired. Another direction in which cement concrete may be used with advantage is evidenced by the manufactures of Messrs. H. Sharp, Jones, & Co., of Poole. This firm has succeeded in making excellent drain-pipes of Portland cement concrete. The manufacture is a very interesting one, and as I have recently been permitted to examine the works, you will perhaps allow me briefly to describe the process. Cement of high quality is mixed with crushed pottery in the proportion of 1 of cement to about 3 of pottery. The concrete is made in small quantities in a special mixing-machine, the materials being first turned over dry, then sprinkled with water from a fine rose and made into a very dry concrete. The mixture is next lifted into a hopper, which feeds it automatically and very gradually into the moulds. These are made as cylinders of sheet-iron, the proper distance apart to form the thickness of the pipe, from 1 in. to 3 in., according to its diameter. This mould rotates slowly on a turn-table, while an iron rammer, worked up and down like a beetle, compresses the concrete into the mould as it falls from the hopper. When the pipe is full, it is wheeled away on a truck, mould and all, and stands for from 24 to 48 hours to set. When taken from the mould, the newly-made pipe is steeped for a week in a bath of silica, to indurate it more effectually, by the ingenious process invented by Mr. Highton, and used by the Patent Victoria Stone Company. The pipe may remain in the bath for about a week, when it is removed and stacked in the open air for some months before it is sent out for use. The Victoria Stone Company, just mentioned, make excellent paving slabs of granite chips and Portland cement. These slabs appear to be very durable, and they are not so costly as common York paving. Mr. Drake has recently shown me some interesting specimens of the marble and granite mosaic work and concrete his company are now producing. I have only now, in conclusion, to express the hope that I may have succeeded in showing that "the use of cement" is a subject well worthy of the careful attention of the architect.

In the discussion which followed, the President (Mr. Ernest C. Lee), while expressing his sense of the great practical importance of the subject treated of by Mr. Redgrave, said he was no great admirer of the homogeneous monolithic houses the erection of which had been advocated.

Mr. W. H. Lascelles (of Bunhill-row) exhibited a number of specimens of his moulded and coloured concrete work, and in response to an invitation from the chair, made a few remarks about them. One moulded or coffered slab which he produced was, he said, designed by a well-known architect, as part of a new method of getting ornamental though fireproof ceilings in rooms. Iron joists were embedded in concrete, and upon these concrete-covered joists the slabs were laid direct, leaving the joists and the under surfaces of the slabs to form the ceiling of the room below, the upper surfaces of the slabs forming the floor of the apartment above. This simple mode of fireproof flooring had received the approval of several architects of distinction. The objection that such floors would be too resonant or noisy when walked upon to allow of their coming into practical use had been falsified by facts. He had built some small houses with floors of that construction, and the tenants made no complaint of noise. Such upper rooms, it should be remembered, being bedrooms, would mostly be carpeted over on the portions walked on. He was now engaged (in connexion with one of the companies who made it their business to erect dwellings for artisans) in seeing whether he could not devise a floor of that kind for such buildings which should be cheaper as well as better than floors of the ordinary kind. The fireproof qualities of the floor had been tested at the Croydon Exhibition of the Sanitary Congress, with conclusive results in their favour. A remarkable property of the concrete material of which these floors were made was that it would bear the driving of nails into it not only without cracking, but would hold them most tenaciously. So well recognised was this quality of the material becoming, that bricks or blocks of it were now used for building into interior walls, instead of wood blocks, for fixing the joiners' work to. The first discoverer of this kind of concrete was the late Mr. Matthew Allen, but it had been much improved upon from time to time, and it had now been found possible to impart to it a good and durable red colour. It could be moulded to any form, and was hardly distinguishable from, though much cheaper than, the best cut brickwork.

Mr. Drake thought that the difficulty of giving concrete work a good aspect externally was now being solved. It had been very difficult to obtain reliable colouring matter for concrete work, and of late he had turned his attention to making the natural surface of the material sightly and even beautiful in itself. Many of the aggregates used, such as marble and granite chippings, were beautiful in themselves, and he had succeeded in making a concrete with a smooth and semi-polished surface in which the pieces of marble and granite forming the aggregates were shown in their own colours, forming a sort of natural mosaic work. (A door in this material, made for the Theatre Royal, Manchester, was exhibited.) The same material was also capable of large and effective use in the shape of small slabs or tiles for flooring purposes.

Mr. J. S. Quilter, in proposing a vote of thanks to Mr. Redgrave for his paper, said the more experience he had of the use of Portland cement, the more reason did he see to use it more largely than ever, and he was glad to see that its use was becoming common on the better class of building estates in the neighbourhood of London. On an estate at Streatham (entirely a clay district) houses were being carried up of concrete made of Portland cement and of burnt-clay ballast in the manner suggested by Mr. Redgrave.

The motion was duly seconded and carried, and Mr. Redgrave having briefly replied, the meeting terminated.

ARCHITECTURAL ASSOCIATION.

At the ordinary general meeting held on the 19th inst., Mr. Ernest C. Lee, president, in the chair, the following gentlemen were elected members, viz.,—Messrs. F. H. Tullock, A. Richards, C. Hunt, W. Cooper, W. M. Mitchell, F. H. Goddard, W. Bennett, W. Mills, J. R. Smith, G. G. Woodward, R. Astley, J. Adkins, A. Clapton, A. Crow, W. P. English, F. P. Pulham, G. H. Sale, G. W. Ward, A. T. Walmisley, H. H. Kemp, E. H. Selby, R. H. Tebb, H. F. A. Chidgey, F. R. Oglesby, T. A. Andrews, R. Barker, E. J. Ram, B. A. Colley, A. B. Few, A. K. Stephens, F. W. Mincey, A. W. Tribe, A. C. Houston, G. F. Byron, A. Huntley, W. Gilruth, E. H. Pritchett, P. Vernon, F. S. Capon, B. F. Simpson, F. Rowntree, F. Wilcox, T. M. Roberts, J. R. Younger, R. M. Kearns, H. Ling, F. L. Lee, W. Parker, and E. E. Carpenter.

Mr. Quilter, honorary secretary of the "Sharpe Memorial" committee, announced that the "Sharpe Memorial Volume" was now nearly ready. The whole of the plates (sixty in number) had been lithographed, and the letter-press was nearly ready. The number of subscribers up to the present time was 134, but it was desired to raise that number to at least 250 before the work was printed. The amount of the subscription was a guinea and a half.

The Chairman announced that in consequence of a domestic affliction Mr. C. G. Vinall would not be able to read the paper on "Furniture" promised by him for the 3rd prox. In its stead, a paper on the "Architecture and Architects of the Sixteenth Century" would be read by Mr. W. Hilton Nash.

Mr. Gilbert R. Redgrave then read a paper on "The Use of Cements," which we print under its own heading.

SCIENTIFIC AND ARTISTIC ASPECTS OF POTTERY AND PORCELAIN.

The first of a series of five Cantor Lectures on "Some Points of Contrast between the Scientific and Artistic Aspects of Pottery and Porcelain" was delivered on Monday evening last in the hall of the Society of Arts, by Professor A. H. Church, F.C.S., who commenced by observing that there were several opinions current as to the effect of scientific knowledge upon the artistic value of the products of manufacture. Some persons argued that the evidence afforded by the consummate beauty of certain Greek vases of what was known as "the period of perfection" would suffice to prove, not only that a rational and intimate and exhaustive knowledge of the chemistry and physics of ceramic materials and processes was not needed, but also that it was almost certain to end in what might be termed artistic disease, if not in the death of true beauty. The idea of such persons was that knowledge,—full, exact, and unbending, fettered the imagination and crushed all the poetry out of the handiwork of man. Quite on the other side were ranged the devotees of science. Science, they said, must be master. Nothing satisfactory, they would urge, could be obtained without mathematical precision. Not content with explaining, by means of all kinds of analytical processes, the causes of the beauty of any product of human skill, those rigid disciplinarians permitted no departure from established rule. But happily there was a third, and, it was to be hoped, an increasing class of persons concerned in ceramic and other manufactures, who took a broader view, and who were prepared to welcome any kind of aid from whatever quarter it might come. They called in the chemist to analyse old materials, and to analyse by synthesis for new ones; but, on the other hand, they would be always on their guard against the dull uniformity, the complete stagnation, consequent upon a mere mechanical routine. They would endeavour to find a scope for individual originality, remembering that a man could not be expected to be always producing the same pot any more than a great painter could be expected to endure the weary labour of continually painting *replicas* of even his best pictures. The energetic director of ceramic works would en-

deavour to learn from the best productions of other countries and other times. He would endeavour to introduce every improvement in grinding and washing the materials used, and in all kinds of glazes or finishes; and with excellence of materials he would do his best to combine good proportion and beauty of outline. It was abundantly clear that if the pottery of to-day was to stand the test of time, not only must it be good in material, but the highest art-knowledge and the highest art-power must be affiliated to the management of our potteries. The continual experimenting of Wedgwood, untrained as it was to a very great extent, would have led to no very great results had not the sweet neo-Classic art of Flaxman been available. In suggestion more fertile, in taste more eclectic, the spirit of to-day, if more exacting than the spirit of yesterday, should endeavour to obtain that quality of all-round perfection which inspired the efforts of the modern potters, though it but too often condemned them. The potters of the present day enjoyed greater and far better opportunities of education and execution than Wedgwood had, and they would certainly fail if they did not take full advantage of them. These were points which had been before urged on various occasions by many minds. In an address which he delivered eleven years ago before a local school of art, he conveyed very nearly the same ideas in very similar words. In the address he pointed out that when Bernard Palissy was at work, no knowledge, or very little indeed, as to the chemical and physical properties of the materials with which he worked was to be had. But during the last hundred years every problem which puzzled Palissy in glazing his ware had been solved by science. Mr. Soden Smith, in his report on the ceramic wares in the Philadelphia Exhibition, speaking of the English productions, contrasted their want of variety in new methods and descriptions of pottery as compared with the inventiveness of Wedgwood, and insisted upon the need of increased art-efforts in connexion with English pottery. To return to his own mode of treating the subject, the lecturer said that the title of the course indicated its scope, but not the limits which many causes combined to place upon his treatment of it. He purposed noting the relations subsisting between the chemical and physical qualities of some kinds of the material used for earthenware, china, pottery, and porcelain, and their artistic qualities as apprehended by the trade. He had then to discuss the physical or mechanical structure of materials used by the potter in connexion with their chemical composition. These were inseparable the one from the other. In other words, the chemical composition and special physical structure went together, and they affected the form, surface, and, of course, the colour of the articles produced,—and by colour he meant not only the ordinary prismatic and tertiary colours, but something more, viz., the transparency or translucency of the material itself. Form was, of course, a matter of primary interest in all good wares. Having, by means of various specimens of Japanese and other ware exhibited, pointed out how the materials used by the potter could be made to lend themselves to diversities in surface, form, and colour, the lecturer proceeded to refer to an interesting point in connexion with hard-burnt terra cotta. He observed that Messrs. Doulton lately noticed that upon all prominent points on any portion of a piece of terra-cotta work that had received special treatment in the way of modelling, or that had been subjected to considerable pressure, there would be found a sort of fine white bloom, at first sight efflorescent, but really not so. Now he had found that by well washing the terra-cotta clay with distilled water, the bloom did not appear in the articles made of clay so prepared. On analysing the bloom he had found it to contain sulphate of lime, which was ultimately turned into a complex silicate of lime, and being in the liquid, as it were, of the clay, it came up to the surfaces most subjected to pressure or to the manipulation of the modelling tools, and, combining with other materials on the surface, formed when burnt a highly vitrified substance, very hard. In his opinion this bloom was very detrimental to the ware. He did not want to see a perfect uniformity of colour, but the bloom to which he was referring did not come in the right places, and was therefore, he considered, injurious to the ware, although he knew that some artists and modellers were rather partial to it. At any rate, it was a matter worth further attention. Having briefly referred to the manner in which the chemical nature of a clay affected not only the wearing powers, but the capacity to receive and retain colour, of such articles as bricks and tiles, the lecturer spoke, in conclusion, of the varied and beautiful effects to be obtained by carefully mixing small quantities of mica, tourmaline, hornblende, asbestos, and other minerals of a like character with the clay used for some kinds of ceramic productions.

The following are the heads of the succeeding lectures of the course, viz.:—II. (Nov. 29), Vitreous, Plumbiferous, Boracic, and Felspathic Glazes and Enamels. Iridescent and Metallic Lustres, and Colouring Substances. III. (Dec. 9). Stoneware and other Wares glazed with Salt. IV. (Dec. 13). Soft-paste Porcelains, European and Oriental. V. (Dec. 20). Hard-paste Porcelains, Chinese, Japanese, and European.

INFLUENCE OF JAMES BARRY UPON ENGLISH ART.

This was the subject of a very interesting paper read by Mr. J. Comyns Carr at the Society of Arts on Wednesday evening last, Sir Henry Cole in the chair. After treating of the life and character of Barry, Mr. Carr said,—I shall not attempt to-night with any fulness of detail either to expound the merits or to mark the defects of Barry's painting. His most important work hangs before your eyes, and I scarcely think it likely that there is in our time room for much dispute as to the intrinsic value of the result. Whatever praise may now be accorded to his talent would go but a little way towards satisfying the claims that were at one time put forward on his behalf. His indulgent biographer contrasts his genius with that of Raffaelle, not altogether to Raffaelle's advantage, and Barry himself, I think, believed that he had established a style combining the noblest qualities of the antique with the chosen excellence of the greatest of the Italians. Looking back with that cruel clearness of vision which comes with lapse of time, we can perceive the absolute insecurity of these pretensions. We are able to recognise that such art as this could not, in its nature, be a full or satisfying expression of the mind of its epoch. The failure, as we have already observed, was, in this sense, not Barry's alone; as he was among the first, so also he was in the same respect the greatest of those who laboured in vain. But the classical sentiment which dominated his style, and which pervaded all the art of the eighteenth century, which strove for the embodiment of imaginative ideas, was in two ways absolutely fatal to the production of any work of real and full vitality. For in the first place, be it remembered, that the conception of the antique world which then governed men's minds was in its essence a dead and paralysing conception. The formula which pedantic criticism and the fashion of the time had combined to force upon the world was such as by no ingenuity could be made to express the movement, the passion, and the variety of human life. Men who swore obedience to such a straitened ideal were compelled, even against their will, to falter in their devotion to nature, and to rigidly exclude from their sympathies the feelings and sentiments of their age. Even a genius so true and so refined as Flaxman's could not wholly escape from the mark of this fashion. He was so far restrained by the prevailing spirit, that he could only reconstruct the classic ideal within the limits of a domestic existence. So often as he ventured into a wider realm, so often do his works bear the impress of reverent learning rather than of individual power. He could not express, through classic forms, the presence of the modern spirit; he had not the strength which could forge the link to bind the old with the new, and if we compare his transcript of Greek art with that which had been made by the masters of the Renaissance, we shall have to confess that, although it bears externally the marks of a greater fidelity to the past, it has not an equal sympathy to attach itself to the realities of a present world.

If we can recognise this limitation in the noblest sculpture of the time, how much more strongly must it impress itself upon the products of an art whose resources imperatively demand vividness of realisation, and whose effects are therefore forced into closer comparison with the facts of nature? Painting of all the many forms of artistic expressions can the least afford to accept a convention which seeks to exclude from its views the energy and passion of actual life; and, in yielding to such an influence, it must inevitably take refuge in the nerveless grandeur of Barry's colossal style, or sink into the pretty insipidities of a Cipriani or a Kauffman. But this devotion to a false and limited idea of antique grace was not merely a source of weakness in itself; it served no less to deprive the painters of the eighteenth century of the full benefit they might have derived from the teaching and example of the great masters of the past. Few artists of his age could boast of a wider and more generous appreciation of Italian art than was possessed by Barry. His letters from Rome, and his notes upon the paintings and sculpture in Venice and Florence, prove that he understood, with a justice and discrimination that were rare in his day, the several stages in the advancement of the art, from Giotto to Michelangelo. He never assuredly made a better use of his fiery and impetuous temper than when he boldly lectured the monks at Milan upon their folly in painting the "Last Supper" of Leonardo; and the energy of his discourse on that occasion would, I think, almost suffice to strike terror into the heart of a modern restorer. But, in spite of Barry's real enthusiasm for the painters of the Renaissance, it is easy to perceive that he was constantly testing their work by reference to the standard of the antique. He did not study or accept them in the sense in which they have since been studied and accepted, as the instruments of a great imaginative impulse, whose individuality was stamped not less upon the method than upon the essence of their art; he chose rather to measure his praise of their genius according as he found they approached in their work to the correctness and proportion of ancient sculpture. Such a process of investigation could not be expected to reach the real spirit of Italian art. It was conducted by men who were intellectually already pledged to an impoverished ideal, which a pedantic criticism had chosen to graft upon antiquity, and who, therefore, discovered that Raffaelle and Michelangelo had little to teach which could not be better acquired from the surviving records of the art of Greece and Rome. There was, indeed, one man in England who possessed a keener insight into the great imaginative design of Florence, and better understood the uses of its example. The genius of Blake shot a momentary radiance across the dull sky, which others could not penetrate at all, and then sank earthward with no sure footing to tread the earth. He had the vision which showed him how great a thing painting had been when it stood as the mirror of men's highest imaginings, and he was quick to perceive the extent of the change that was needed before English painting could hope to undertake this difficult duty. But he must be judged as a seer rather than as an artist, for he had no strength sufficient to effect the revolution he so ardently desired, and while he failed through lack of practical power, others who were, like Barry, more perfectly equipped, failed no less from the lack of that intensity of imagination which, in Blake, was developed to the point of disease.

The defects that might be anticipated from this superstitious devotion to Classic style, with its consequent misapprehension of the greatness of Italian design, are easily traceable in the works of Barry. We are struck at once in his pictures with the want of individuality, not merely in the features, but in forms, with the lack of passion and character in the faces, with the absence of expressive energy in the movement of the limbs. The action is either tame or exaggerated; the figures, even where the scale is colossal, are wanting in grandeur and dignity, and, at first sight, these things are more surprising, seeing that there existed at this time another kind of art which would specially tend to the development of the very qualities we miss. It is a remarkable phenomenon that the efforts of men like Barry, and West, and Haydon were contemporary with a series of the most brilliant triumphs in the practice of portraiture, and nothing shows more conclusively the insecure basis of the so-called ideal art of the period than its rigid and determined exclusion of all those qualities which make portraiture interesting. The comparison of two men like Barry and Reynolds must now be fatal to the pretensions of the former. Nor is this dependent merely upon difference of individual genius. If Reynolds had undertaken the task that

Barry attempted, he, too, would have failed in a greater or less degree, and it remains for us to consider, as one of the most interesting problems connected with art-history, in what manner the gradual progress of painting in England and in Europe has led to the decay of imaginative design, and to the assured supremacy of the departments of portrait, landscape, and the realistic illustration of contemporary manners. Looking first to England, we may see that the force of the Reformation, whatever may have been the gains in a spiritual sense, had unquestionably the effect of suddenly snapping the artistic tradition. It is not to be said that, even under more fortunate conditions, our early English painters could ever, by their independent effort, have enlarged the capabilities of their art as to render it fit to compete with that of other nations, but it is nevertheless true that, up to the time of the Reformation, English painting had a real existence; and if we go back to a still earlier date, we shall discover a period when the illuminated works of English MSS. were the most perfect in Europe. If, then, the Reformation, with the Puritan movement by which it was followed, had not entirely depressed the artistic spirit, the successive revolutions of style, which were deferred till the next century, might have more rapidly completed themselves, and the English school, as we now know it, would have had an earlier birth. But, when the Reformation came, the imaginative impulse was turned into a different channel. The force of the Protestant feeling expended itself in denunciation of the ornate luxury by which the earlier ritual had been surrounded, and, in the condemnation of Romish doctrine and practice, it was inevitable that all the outward graces of life, and the arts by which they were sustained, should be temporarily discouraged. Imagination, escaping from the control of the Church, and seeking for itself a free realm, became, by a strange irony of fate, one of the strongest elements of opposition to the art which, of all others, most imperatively needs imagination; and the artist, thus deprived of the sympathies of those who led the new movement of ideas, made scarcely any effort to keep pace with the intellectual development of the time. All the strength of our Renaissance found expression in our literature, and we are left to guess who, among the earlier poets of our school, might, under different conditions of national life, have become great imaginative painters. I know not if it is only a fancy, but I have sometimes thought that, in the author of the "Fairy Queen," there dwelt the soul of a painter; and in the precise and ordered pattern of his verse, so richly and so lovingly adorned with the description of all that might give delight to the eye, we have enshrined a series of visions that might, under other conditions, have found their way on to fresco or canvas. But it is only in the earlier stages of our literature that we are permitted to indulge such fancies, for soon the poet became also the dramatist; and the drama, while it is the highest expression of the literary spirit, serves also most clearly to assert the distinctions between the modes of literature and art.

Seeing, then, how completely literature had absorbed the national energies, it is not surprising to find that the after-growth of art in England is due to a foreign source. In the minds and in the homes of the cultivated classes the taste for art survived, and we had great collectors and connoisseurs before we could boast of great artists. Even before the Reformation had left its mark upon the English spirit, Holbein had found a home at the English Court, and when the work of the Reformation was complete, or nearly complete, Rubens and his great pupil, Vandyck, were invited to our shores. At first sight, indeed, it may seem strange that the residence among us of these great masters of the craft did not avail at once to establish the tradition of imaginative design, but the solution of this riddle is to be sought as well in the nature of the art of which these men were the professors as in that determined impulse towards literature of which we have already taken account.

House Property.—The freehold house, No. 49, Long-lane, Smithfield, adjoining the Barley Mow Tavern, one of the oldest houses in the City of London, having a ground-floor area of only 190 ft., was sold last week by Mr. Robins, of Waterloo-place, for the sum of 860*l.*

DUDLEY GALLERY.

The present Winter Exhibition of Cabinet Pictures in oil is the fourteenth held here (so flies time), and comprises 453 paintings, and a dozen little pieces of sculpture. Of these latter Mr. Mullins sends "A Little Maid," in terra-cotta, Mr. Lawson a "Jeannie Deans," in the same material; and clever Mrs. R. J. Fennessy "Donatello, a Sketch for Bronze," which would pair very well with her "Cimabue," already issued in that metal. The collection of pictures shows much sound, honest work, but very few productions to excite great admiration. Looking even to the best known names, it is regrettable to find Mr. G. D. Leslie, R.A., wasting his skill on "Apple Dumplings" (150), and Mr. Stacy Marks, R.A., sending such an utterly uninteresting affair as "Studying Impromptus" (111). Mr. McWhirter's "Thunder Storm on the Grand Prairie" (107) is too like some very special occurrence to be accepted as representing the general. Nevertheless, there are plenty of pleasant pictures to justify a visit, as for example the "Pannier de Fleurs" (53), by H. Fantin; the charming "Spanish Lady" (61), by J. B. Burgess, A.R.A.; "Luring a Conger" (75), H. Macallum; "Première Communion, Dieppe" (95), a sketch by P. R. Morris, A.R.A., "The King's Highway" (173), S. E. Waller; "Le Déjeûner" (200), by Leon Lhermitte; "Souvenir of Algiers" (273), by A. Armitage, R.A.; "Rondinella" (295), by Alfred Ward; No. 324, by C. J. Lewis, marked,—"Now came still evening on and twilight grey"; and many others.

A SEWAGE FARM AT DARLINGTON.

Situated near to the border of the great coal-field of the North, and served early by railways, the ancient town of Darlington has in the past few decades risen in importance, in extent, and in population greatly. And whilst its wealth and that of its merchant princes have been multiplied, there have been some of the difficulties attendant upon large populations. For long the sewage of the town was dealt with after the primitive fashion, the river Skerne running near; but latterly a system of sewerage was introduced, and the outfall placed some miles below the town, and close to the junction of the rivers Skerne and Tees. But ultimately this disposal of the sewage of so vast a population was greatly objected to, and an injunction was obtained, forcing the Town Council of the borough to cease polluting the river. They resolved ultimately to dispose of the sewage by the establishment of a farm, to which it is conveyed. Thence, pumped up by an engine, the sewage is disposed of by irrigation; and whatever may be said of the cost of the sewage farm,—and on this head something is often said by the Town Council and the ratepayers,—it must be acknowledged that the river is purer, and that the complaints of its pollution are never heard of below the town. It is to be regretted that river pollution is allowed above the town of Darlington, and this the more because below that pollution the water supply of the chief towns on Teesside is abstracted from the river. Though the water may be purified in its course, yet there is an old adage that "prevention is better than cure," and it is regrettable that this has not been applied to the towns and villages above the water intake, as it has been to the one below that intake.

The sewage-farm of the Darlington Corporation has been in operation a few years, and it has cost close upon 100,000*l.*; the exact cost up to the date last reported,—March last,—being 97,165*l.*, this being the cost of land, of drainage formation, main effluent sewer, pumping station, reservoir, &c. The land obtained was in 1876-7, about 225 acres, and there has been a further addition since. In the first of these years the work in connexion with the needful reservoir was commenced, the engine-house being completed in the following year. Cottages for engine-men and farm-labourers were built in that year, and to these there have been added buildings for about fifty head of cattle and ten horses. Of these works, the cost was:—Preliminary Act of Parliament, 898*l.*; land and expenses, 53,323*l.*; outfall drain, 1,139*l.*; formation of main carriers, receiving-chambers, under drainage, &c., 6,834*l.*; reservoir, 4,546*l.*; gravitation sewer, 585*l.*; pumping-station and main, 5,454*l.*; and cottages, 487*l.* Up to March, 1879, the total cost was 73,339*l.* Since then additional land to the value of 20,623*l.* has been bought, and other items of cost have brought the total up, as before stated, to nearly 100,000*l.*

For the most recent period for which the official facts have been issued, it may be said that there were 203 acres of the farm under crop. Of these, 85 acres were permanent grass, 22 acres rye grass, 8 acres potatoes, 13 acres turnips, and 23 acres barley. Including the stock on hand, the amount spent on the farm in the last financial year was 10,521*l.*; and the receipts, exclusive of the amount taken from the rates to balance, were slightly less than 6,700*l.* The loss, which fell on the rates, was in that year 3,838*l.*, the amount for the previous year being considerably more. As there are considerable receipts from and payments for live stock, it cannot be said what is the exact loss to the borough from the working of the farm; but it needs to be borne in mind that it is still young, and that it has been entered on in a period of depression for the agricultural interest, and one in which prices of many kinds of farm produce have been very low. As tending to show what the produce of the farm is, it may be added that last financial year there were received 186*l.* for barley, 25*l.* for beans, 69*l.* for hay, 1,109*l.* for milk and butter, 127*l.* for potatoes, 52*l.* for mangolds, 18*l.* for willows, 26*l.* for wool, and 84*l.* for straw. It is evident that though at first there must have been, and there has been, a heavy loss, yet that loss is being reduced, and there are yearly larger receipts from the produce. For some kinds of agricultural produce it is clear that the course of treatment is most fitting, and that from the sewage-farm large crops will be realised. It remains to be seen whether as a farm it will pay its way. It is clear that when farms at a rent comparatively low have barely made ends meet, and have sunk hundreds of pounds, land which has had to be purchased compulsorily at a high value can scarcely be expected to be a commercially good speculation; but it may be said that the farm not only relieves the borough of a difficulty, but in addition it converts what was a nuisance into a blessing. The supply of food is greatly increasing from the land, and is likely still further to increase. And if in the future, with better seasons and better crops, there should be a more remunerative working of sewage-farms, boroughs must expect to have to contribute to them, and that contribution must be taken to be that which represents the cost of the disposal of the sewage, and part of which might have been spent on the older plan.

THE HONESTY OF ENGLISH MANUFACTURERS.

In the opening address delivered at the Society of Arts on the 17th inst., by Mr. F. J. Bramwell, F.R.S., Chairman of the Council, the writer, speaking of the causes of the falling-off in the demand for the products of our industries, said:—

It may be there will be found, and I fear there will be found, but I do trust in only a few instances, that we have lost command of foreign markets, and even of our own markets, because in these instances the manufacturers have not been honest. There was a time when, travelling on the Continent, one was proud to see English manufactures put forward as those to be thoroughly trusted. A foreigner felt that if he bought an article of English make, though it might not be tasteful, at all events it would be what it purported to be,—sound, honest, and trustworthy. I am afraid we cannot now say so of all that is exported from our country, or that is offered for sale within it. I do hope we can say so of most of our manufactures, but we certainly cannot say it of all. But it should be remembered as against those who commit this grievous wrong of casting a slur on the character of any of our industries that they not only do harm to the particular manufacture with which they are connected, but they do harm to the character of the whole produce of the nation. A man who has been trapped into buying a bad English product of one kind is not at the pains to ascertain whether the badness is confined to this particular manufacture, and in all probability he has not the means of ascertaining, but he says, "I bought an article which came from America, and I found it good, sound, and trustworthy. I bought a similar article that came from England, and it broke in fair use, and when it broke its internal rottenness was discovered. In future, not only with regard

to this article, but with regard to others, I shall distrust the English make, and shall prefer the American."

In connexion with this most painful subject of unfair dealing, to my mind there is nothing more humiliating than the confession of widespread dishonesty which the nation had to make some few years since, when, for mere self-preservation, it became necessary to pass an Act of Parliament, directing the appointment of public analysts. The passing of this Act was a confession that, among those who supply food, which is to support life and to preserve the health of those who are in health,—and worse even than this, if possible, that among those who supply the very drugs which the physician prescribes to restore health to those who have lost it,—there were to be found numbers who made the food and the drugs alike the subjects of fraud,—fraud that did not stop short at the mixing with the food or with the drugs materials which were inert, and which did harm by diminishing the nourishing or the curative power of that which was purchased, but fraud which extended to the mingling, in some instances, of materials which were, in themselves, actively unwholesome,—materials which, being taken with the food, converted the food into a source of disease, and being taken as curative drugs, converted those drugs into positive poisons.

Is it not too much to be feared that, in some industries, at all events, that reprehensible conduct which has rendered necessary the appointment of public analysts to protect the population of this country, has been the guide of certain of the manufacturers, and has thereby caused us to export that which is a fraud upon the foreign buyer, and a discredit and an injury to the country that exports it?

I had intended to refrain from instances, but I will endeavour, in general terms, to state one which relates to a very large industry. It appears that in a certain manufacture the purchasers preferred to buy goods that were dyed in one stage of the process rather than in another, as the goods thus dyed were supposed to be better, and they naturally, therefore, commanded a higher price. The finished goods bore on themselves indications which enabled any purchaser at all acquainted with the manufacture to determine at a glance in which of the two ways the article offered to him had been dyed. Then came the deceit. Means were adopted by which the appearance that would have been presented, but for these means, upon the material dyed in the undesirable way, was concealed, so that the appearance really presented was that which would be shown by the manufacture when dyed in the desirable way. It is true that experts in the trade can, after the deceit has been employed, distinguish the one fabric from the other, but the ordinary buyer living abroad, and not suspecting the fraudulent ingenuity that had been exercised in England, and seeing, as he believes, the well-known appearance indicative of the superior mode of dyeing, is deceived, and pays a higher price than he would have paid had he known the truth. It cannot be urged in explanation that this contrivance was resorted to because the appearance presented by the one fabric when in use was superior to that presented by the other. This was not so, as the part of the fabric that was thus treated was the very edge, and was cut off before the fabric was used.

You must not imagine that this deception was practised by a few, or to a limited extent. So far from this being the case, it became worth while to invent machines to supersede the handicraft preparations by which the deception had been originally practised, and these machines were patented. I need not say that such patents are voidable, as being against public policy, their purpose being that of fraud. I am aware I shall be told these are hard remarks to make upon a practice which has now prevailed for years, and to such an extent as to entitle one to say,—"It is commonly done. Everybody does it. Why, therefore, reproach us with that which is a custom of the trade?" I answer, "Because it is a custom for the purpose of deceit."

With respect to commerce, I do not know much about the way in which it is carried on, but I cannot help seeing the statements which appear in the public press from time to time, and if these are well founded, and that they are cannot, I think, be doubted, looking at the fact that they are not contradicted, it would appear that commerce is pursued, in certain instances, under conditions which, equally with those of the manufactures I have been condemning, are a fraud and a disgrace.

BUILDERS' BENEVOLENT INSTITUTION.

An election of pensioners on the funds of this Institution took place at Willis's Rooms, St. James's, on Thursday last, Mr. Thomas F. Rider, president, in the chair. There were nine candidates (five men and four women), of whom four (two men and two women) were to be elected. The poll opened at noon and closed at three p.m., shortly after which hour the scrutineers, Messrs. Thomas Stirling and F. W. Keeble, announced the result of the voting. The following are the names of the candidates, together with the number of votes recorded for them, viz.,—Hugh Richard Bowley, of Clerkenwell, aged 56, 2,002 votes; John Humphries, of Barnes, aged 70, 1,938; James Pilgrim, of Haverstock-hill, aged 60, 310; Thomas Gregory Bartlett, of Battersea, aged 65, 654 (including 80 votes to which he was entitled by reason of having been a subscriber to the Institution); John Page, of Marylebone, aged 67, 1,206 (the whole of the foregoing candidates now for the first time applied to be elected); Mary Ann Garner, aged 64, widow of Mr. William Garner, builder, Harrow-road (third application), 3,483 (including 80 votes due to her owing to her husband having been a subscriber); Selina Thomas, aged 72, widow of Mr. Charles Thomas, builder, of Upper York-place, St. John's-wood (third application), 2,084; Anne Boulton, aged 60, widow of Mr. Webber Napoleon Boulton, builder, Upper Clapton (third application), 1,750; and Martha Mann (first application), aged 60, widow of Mr. Samuel Loveys Mann (of the late firm of Newman & Mann, builders, Upper Thames-street), 6,174, including 390 votes to which she was entitled by virtue of subscriptions to the Institution by her husband's firm.

The President, therefore, declared the successful candidates to be H. R. Bowley, J. Humphries, Mrs. Mann, and Mrs. Garner.

Votes of thanks to the scrutineers (moved by Mr. George Plucknett, seconded by Mr. Cruttenden, and acknowledged by Mr. Stirling), to the checkers of votes (moved by Mr. Dines, seconded by Mr. T. G. Smith, and acknowledged by Mr. Bussell), and to the Chairman (moved by Mr. Phillips and seconded by Mr. Head), were duly carried.

The President, in replying, referred to one or two matters of interest in connexion with the Institution. Firstly, the Institution had, by the will of the late Mr. Larner, become reversionary legatees of that gentleman's estate. After the death of Mr. Larner's widow and daughter, the Builders' Benevolent Institution, jointly with the National Lifeboat Institution, are to share the estate. It appears that Mr. Larner's mother was a pensioner on the funds of the Institution, but was taken off them when the family found themselves in better circumstances. Secondly, a foreman in the employ of a leading London building firm, having on the completion of a job received a gratuity of five guineas, had thought he could not do better (seeing that his father was elected a pensioner on the funds of the Institution some years ago) than hand the money to the Institution which had supported his father in his old age. These incidents were, Mr. Rider thought, of sufficient interest to be mentioned on that occasion.

BRITISH ARCHÆOLOGICAL ASSOCIATION.

The opening meeting of the new session was held on Wednesday, the 17th inst., the Rev. S. M. Maybew in the chair. The Rev. Prebendary Scarth described an early font, apparently Saxon, in Stanton Church, Gloucester. The Rev. J. A., Lloyd reported the discovery of Saxon carved work during the recent restoration of his church at Broad Hinton, Wilts, and exhibited a full-sized drawing. Mr. Loftus Brock, F.S.A., reported the discovery of a Roman pavement of beautiful design, in the Close, Winchester, of which the Rev. C. Collier sent a drawing. Mr. Lewis exhibited a rubbing of a Saxon coffin-lid found at Bexhill Church, where much Saxon walling has been found above the Norman arches during recent repairs. Amongst other exhibits, the Chairman produced several beautiful specimens of early pottery found in London, including a thirteenth-century green ware jug, of large size. Also an early Chinese carving in jasper, found in excavations at Bishopsgate. Mr. Thomas Morgan, F.S.A., read a paper on the results of the recent Congress at Devizes. The second paper was by Mr. C. H. Compton, on the Cradle Tower in the Tower of London, which has recently been opened out and freed from the modern buildings that surrounded it. The roof is beautifully groined, and, as the reader observed, the tower afforded access from the moat to the Queen's apartments. The whole has been thoroughly repaired under the direction of Mr. Taylor, of H.M. Office of Works.

FREEHOLD GROUND-RENT IN LEICESTER SQUARE.

THE ALHAMBRA THEATRE.

A large number of capitalists was attracted to the Auction Mart on Tuesday by the announcement that Messrs. Chinnock, Galsworthy, & Chinnock would offer for sale a freehold ground-rent of 710*l.* per annum, secured by the greater portion of the Royal Alhambra Theatre, in Leicester-square, together with two attached residences, Nos. 24 and 27, Leicester-square, with reversion in thirty years to the rack rental, estimated at 5,000*l.* per annum. The particulars describe the theatre as occupying one of the most prominent positions in the West End, and comprising a noble and substantial structure, erected about the year 1850 by a public company under a charter of incorporation, at an enormous cost, and affording accommodation for about 4,000 persons. The whole area of the land, including the site of the two adjoining houses, was stated to be nearly 12,000 superficial feet.

The auctioneer, before asking for bids, enlarged at considerable length on the very great value of freehold land in the locality, as well as on the value of the building itself, observing that in the event of its possible conversion, it was well adapted for Government offices, co-operative, or any other public purpose, and that supposing any such change in the character of the building to be contemplated, the probability was that arrangements could be entered into with the present proprietors of the theatre.

The first bid made was 15,000*l.*, and 17,000*l.* having been offered, there was a pause in the biddings, on which the auctioneer observed that if they estimated it at twenty-five years' purchase on the ground-rent, which he considered it worth, it would amount to more than had been offered, and then they must add to that a considerable sum as the value of the reversion. By further advances the property was brought up to 21,000*l.*, when the biddings again stopped, on which the auctioneer remarked that it was about the only freehold land in the neighbourhood, the land generally in the locality being leasehold; and he reminded them that the selling price of freehold land in the vicinity of Leicester-square at present was 3*l.* per foot, which represented 36,000*l.* as the value of the site at the present day, which must yearly increase. There being no further advance, the property was withdrawn.

SALE OF BUILDING SITES AT SNARESBROOK.

An estate at Snaresbrook, which has just been laid out for building upon, was offered for sale at the Auction Mart, on Thursday, the 18th inst., by Mr. F. G. Hunt. The estate is situated near the Snaresbrook Railway Station, close to Wanstead, and was described as a portion of the comparatively small quantity of land that can now be sold near to Epping Forest. The sites offered were twenty-three in number, having frontages varying from 32 ft. to 60 ft. in length, and from 130 ft. to 200 ft. in depth, They are intended for the erection of a superior class of houses, one of the stipulations being that no house to be built on any of the sites facing the high road to Chigwell shall be of less value than 600*l.*, whilst the houses to be erected on other portions of the estate are not to be of less value than 400*l.* Another stipulation prohibits the carrying on of any trade or business whatever on any portion of the estate. Nine of the sites were sold, two of them having frontages of 64 ft. and 50 ft. each, realising 255*l.* and 250*l.* respectively; six others, with 32 ft. frontages, fetching prices varying from 165*l.* to 150*l.* each; and a site fronting Nightingale-lane, on another part of the estate, and angular in form, with a frontage of 44 ft., realising 100*l.*; the total proceeds of the sale amounting to 1,535*l.*

COMPETITIONS.

Exeter.—The competition at Exeter between the architects of that city for the new church at New Town has (as we announced a fortnight ago) resulted in the choice of the designs of Mr R. Medley Fulford to be executed, and those of Mr. E. Webb to receive the second premium.

The design selected for execution, with the motto "Laus Deo," is a simple composition in the Geometrical style, having double transepts, not of great projection. The clearstory has two-light windows, with transoms. The walls are to be of brick, relieved with freestone, and the brick will show in the interior. The piers of the arcade are to be of Devon reddish granite. There is a tower at the north-west angle, having a pack-saddle roof, with a very ornate flèche rising from its centre. A passage to each of the vestries north and south is entered under the east window. The nave roof is boarded in polygonal form, and divided by the principal arched ribs.

"Cui Bono," the second premiated design, is a composition of Byzantine or Lombard character, in brick, the nave having a spacious clearstory with coupled windows. A bold campanile rises at the north-west angle. There is a narthex at the west end opening into a baptistery semi-circular on plan. The roof is of tie-beam construction, with five arches springing from enriched columns, with good effect. The author is Mr. E. Webb.

"Confidence" is a bold and simple Early English design, with tower and spire at the south-west angle, transepts, wide chancel aisles, and an apsidal east end. Its author is Mr. E. H. Harbottle.

"Omnia diligentia subjiciuntur" is a Geometrical design. The north transept is the base of a tower surmounted with a wood spire covered with lead. The area seats 800 and more, as demanded, and a west gallery is shown. This design was submitted by Mr. Ashworth.

"Si Fortuna juvat" is conspicuous from its lofty north-west tower having a tall spirelet at one angle, and a pyramidal roof seen over the battlements. The style is Early Decorated. The length of the nave clearstory is relieved by two gablets, each containing two windows of increased height and nicely managed on the inside. There is a ventilating spirelet in the centre of the nave roof. A narthex extends from the tower along the west end, giving access to the western doors. The arcades are intended to have pillars of Devon marble. This design is by Mr. Pearson Hayward.

Pontefract.—In answer to advertisements there have been sent in no fewer than fifty-nine sets (average five to nine sheets in a set) of drawings, under various mottoes, for a new addition to the very old town-hall of this borough, and during the last few days the ratepayers, &c., have had an opportunity of viewing these ideas of architects from all parts of the kingdom. The first premium being only 50*l.*, and the second 25*l.*, the authorities are surprised to find such keen competition. The vote in Council restricts the sum to 7,000*l.* as the cost of the new buildings, but some of the designs are so elaborate in detail that the stone front of the hall will swallow up that amount, and make a total of nearly 20,000*l.* Indeed, out of the whole lot it would be difficult to select half a dozen sets which any respectable builder would undertake to build for the amount specified. The corporation will do well to fairly weigh the various conditions set forth; and before deciding we hope they will take into their confidence some professional architect.

REVOLVING DIVISIONS OR SHUTTERS.

Probably the largest movable division ever fitted up has been supplied to Scotland by Salmon, Barnes, & Co., for St. Bridget's New Roman Catholic Schools. It is for the purpose of screening the altar from the schoolroom, and is worked by the patent balance-weight motion belonging to the firm, and can, by means of the ordinary long arm, be raised and lowered instantly. The dimensions, according to the statements which reach us, are so much in excess of what has hitherto been considered practicable in the way of revolving divisions or shutters, that the makers may be fairly congratulated on having solved, with their patent balance motion, a difficulty which has hitherto been a serious one in regard to divisions of large apartments.

COMPENSATION CASE.

Mr. Under-Sheriff Burchell, at the Middlesex Sheriffs' Court, last week presided over a special jury in the case of "The Metropolitan Board of Works *v.* Thurgood," which was an appeal from an award made by Mr. Rodwell, M.P., in respect of twelve small tenements in Commercial-place, Whitechapel, required under the Artisans' Dwellings Act. The houses were in a low neighbourhood, and had been condemned. The evidence, as usual, was very conflicting as to the value of the property. The surveyors for the Board estimated the value at 1,250*l.*, and the surveyors on the other side put the value at 2,450*l.*

The amount of the award by Mr. Rodwell, M.P., was not allowed to be mentioned to the jury, and the Under-Sheriff, in summing up, said the case was of considerable importance, because if the verdict were less than the award Mr. Thurgood would have to bear the expenses, and he (Mr. Burchell) thought that, as a member of Parliament, the sooner Mr. Grantham got the law amended the better.

The jury retired, and on their return assessed the value at 1,900*l.* The award was 2,100*l.* Mr. Grantham, for defendant, said, as the verdict was less than the award, he had to ask, under the Act, for 20*l.* as costs. The Under-Sheriff said he should certainly grant the application. A verdict for 1,900*l.* was accordingly entered.

"THE USEFUL AND THE BEAUTIFUL."

Sir,—Mr. W. Cave Thomas, in the *Builder* of the 20th inst., writing on this subject, says,—"Why should we not be content on occasion, as Nature is, *with a little robust and useful ugliness?*" Simply because there is no reason why anything should be made ugly. "The elephant is not beautiful"; no, but it is better than that, it is a noble animal. The finest and grandest works we have are as a rule the most simple,—in painting, architecture, sculpture, and engineering. A work often becomes ugly because the foolish designer *tries* to make it beautiful *by adding work to it.* An ugly building could often be made passable by knocking down some of its features rather than by adding more. As a rule, anything ugly could have been made to look well *at the same cost* if a little taste had been added, and if its ornamental work had all been omitted. Why is it that the back of a building is often much finer than the front? Because it has been designed for utility and without straining after effect. The exterior of Newgate is one of the best buildings in London. Simple and grand; how very different to the style now so much in vogue in the City! The great thing is, not, as Mr. Cave Thomas says, "to be content with a little ugliness," but to be particular in avoiding any one ugly point in anything. *The absence of ugliness* is *the* great point; it does not matter how simple a building is (the more so the better, I say), let it be useful and well planned, simple and of *good outline*, and the beautiful will then, and not till then, come in as an accessory.

Mr. Cave Thomas says there is "ugliness in Nature." A very ugly remark which I certainly cannot agree with. G. T.

DISTRICT MARKETS.

Sir,—I am glad to see that this subject finds place in your columns, and, as an inhabitant of Kensington, I venture to say that no district stands more in need of such a market than ours. Kensington is a charming place to live in, and few people willingly leave it, but it is a most expensive place, on account of the extremely high price of provisions. These are, indeed, charged at higher rates here than in the immediate neighbourhood of Grosvenor-square and Mayfair. I fully agree with the opinions expressed in the first letter which appeared in the *Builder* in respect to Continental markets and their advantages, and the excessive cost of fish here; and what is true, doubtless, of other parts of London is in its fullest force in this locality. In respect to the second letter, which I see in your issue, it does not appear that the Company, to whom the writer is the architect, purposes to cover the whole subject; at least in as far as is indicated by its title, "The Local Meat Market." I should have preferred to see the designation a wider one, such as, "The District Markets Company," for instance; for my idea of what is wanted in Kensington, in Chelsea, and in Bayswater, is a district market in each parish, situated probably near its railways, where not only meat, but vegetables, fruit, and flowers, fish, fodder, and other supplies of constant consumption and convenience to the public, might be found and purchased for ready money, without the buyer having to pay most unjustly for the credit which is given to others or for those who do not pay at all. I am neither a speculator, a builder, nor an architect, and I have not a railway share; and it is merely as an inhabitant of Kensington that I add that there are two extensive plots of ground, at present chiefly unutilised, between the Gloucester-road Station and the High-street, Kensington Station, which might, it appears to me, either of them accommodate conveniently to the neighbourhood such a district market as would be a great public benefit. These plots belong, I believe, to the railways that join and diverge here, and the proximity of a fine public market to them might be suitable and commodious in several ways, and especially for their conveyance of supplies to it; but such questions as these I leave to others more competent to deal with them than I am, and, moreover, I would not attempt to trespass unduly on your valuable space. Sigma.

ARCHITECTS' SPECIFICATIONS IN RELATION TO WOOD.

Sir,—The writer of the article in the *Timber Trades' Journal* under the above heading is no doubt a sufferer from the wording of the specifications, which do obtain what their authors require, viz., that all woods shall be of the best quality only; and with this very necessary provision, any one acquainted with the timber trade of former years and that now in existence knows the great difficulty there is of getting really sound and good quality now as compared with the former period. This, no doubt, is the reason of the complaint, and the only reason which has any value, for that of selecting sizes which can only be obtained by sawing is absurd. There was a time when only 3 in. by 9 in., 3 in. by 7 in., and 3 in. by 11 in., were obtainable, but now almost every conceivable section can be obtained direct from the timber merchant. John Geo. Carey.

LAW OF EASEMENTS: CLAIM TO LATERAL SUPPORT.

Sir,—Nothing possibly is more crude or imperfect than the existing law, or, more properly, want of law or legal definition in these cases. In fact, we have to deal with the *lex non scripta*, or unwritten law.

One of the *dicta* is that every building is, or should be, capable of self-support, and is not entitled to "extraneous support." Another says, if you disturb any existing easement or support you are liable in damages.

With all these conflicting statements, let me suggest a *viâ media*, whereby the various interests may be considered. *A priori*, whoever disturbs the *status quô* should do so at his own risk and peril, and it should be provided that a three months' notice, as in party walls, should be given, this notice applying equally to any external wall abutting on vacant ground or land; and any and all costs and charges in securing such premises, and making good any damage, should be at the sole cost of the building owner.

It may happen that a building is endangered, or the reverse, so that by being properly underpinned it has a much better foundation than existed previously. Many of the so-called easements have been simply trespasses that have passed unheeded, as where a small window has been formed in an external wall overlooking the ground of an adjoining owner without consent. In such matters, where no written consent can be shown, the contrary might be assumed.

Under the Building Act of 1844, any one so forming an opening improperly could, on one month's notice, be required to brick it up,—a matter now only to be treated as a trespass at common law, and thus made more difficult.

Robert Lacon Sibley.

N.B.—The defect is a want of any mode of legal procedure to be followed in these matters; it is, therefore, essential this should be supplied.

"Appleton's Patent Self-Centre Rule."—The patentee has hit upon the notion of marking and figuring his rule in half inches both ways from the centre, so that on applying the centre to any given point the operator can read off right and left any number of inches or half inches on each side. For hanging pictures, mounting drawings, and many other operations, it will certainly be found more handy than an ordinary two-foot rule, and as there is no reason why the new marking should make the rule any dearer, it will doubtless be largely asked for in preference when it is known.

THE MODERN BARRACK: ITS PLANS AND CONSTRUCTION.

SIR,—May I correct an omission that seems to have occurred in all the published reports of the paper upon this subject read by Mr. Ingress Bell at the Royal Institute of Architects?

Neither in the Transactions of that body, nor in the professional papers, is any allusion made as to the authorship of the numerous designs of modern barracks exhibited at the meeting. Mr. Bell must, therefore, have failed to make it clear that I was the designer of them all, with the exception of the elevations of the Knightsbridge Barracks.

In these several works I was ably assisted by Mr. J. M. Rogers, A.R.I.B.A., and the other architectural draughtsmen of the Designing Branch, which was under my immediate supervision. I regret that I was unable to be present at the reading of the paper; I should have been able to explain some points which, by the reports, appear not to have been clearly understood.

H. C. SEDDON, Major R.E.

COMPETITIONS.

LIVERPOOL INSTITUTE SCHOOL OF ART.

SIR,—I learn (from this week's *Builder*) that no less than seventy-five sets of designs (embracing 598 drawings) have been sent in for the above building, the contemplated outlay on which is only 10,000*l.*; yielding, therefore, if executed, a commission to the profession of about 500*l.*

In the interests of the profession may I venture to ask each competitor to assist the investigations of the Competitions Committee of the Royal Institute of British Architects, by kindly informing me by letter (under his motto if he pleases) the actual out-of-pocket expenses incurred in preparing his design, and also, as nearly as he can, the amount of time expended on it by himself or his assistants, and his own assessment of the value of such time.

THOMAS POTTER, Hon. Sec. to the Committee.
No. 2, Westminster Chambers.

BUILDERS' AGREEMENTS.

SIR,—Will you, or any of your corresponding architects, inform me if it is not the custom for architects to draw up agreements, and have them signed and witnessed in their own offices, when relating to buildings they have in hand?

I have recently had two disputes respecting the payment by builders for their agreements and stamps (though the specification stated distinctly they were to pay), and in one case the party employed a solicitor, who stated that I, as an architect, was liable (under some Act) to a penalty of 20*l.* for preparing the agreement and charging for it, as it was an infringement on the rights of the legal profession.

Now, if this is correct, it is a serious thing for architects in small provincial towns, as most of the works are let in separate trades, and I have had work, say for a small house costing under 400*l.*, let in five separate branches,—*i.e.*, the brick-work, wood-work, slating, plumbing, plastering, and painting,—all let separately, and separate agreements signed by each trade. If it is necessary to go to a solicitor with each contractor in a case like the above, I should like to know who will pay his charges, as a proprietor would certainly object. INQUIRER.

PARLIAMENT-STREET PAVEMENT.

SIR,—In a paragraph headed "Wood Pavement," in your number of the 20th inst., you say,—"It is expected that the works, which are being executed by the Asphaltic Wood Pavement Company, will occupy about a fortnight or three weeks." As manager of the Asphaltic Wood Pavement Company (Limited), I beg to inform you that the work in question is not being done by my Company. The difference between which, and that now being laid in Parliament-street, may be seen by any one passing through Chandos-street, Strand, which is now being paved on the Company's system. FRED. W. SMITH, Manager.

Books.

Songs and Poems from 1819 *to* 1879. By J. R. PLANCHÉ. London: Chatto & Windus, 1881.

MRS. HENRY MACKARNESS, the author, herself, of a host of popular books, has collected under this title a number of her admirable father's songs and poems, not merely for the poetic genius shown in them, but as illustrative of his gentle and genial nature, which enabled him to live to the age of eighty-four without making an enemy. It is a charming little book, fully justifying this view, and more. We should have been glad, however, if it had been made to include even more of Mr. Planché's songs than it does. For example, "The Bumper of Burgundy," a song immensely popular in his time, and which, in his absence abroad, was published by Braham, as we have often heard Planché say, without the name of the author of the words. Again, one song, a powerful denunciation of evil, written for the remarkable spectacle "Babil and Bijou," and which was not sung in the piece, is alone given, though many, we think, would be glad to have the whole of the songs that were written for it. So charming are they, that Mr. Boucicault, in his little "Book of the Play," sold in the house during its performance, speaks of his own work as being simply a basket to hold Mr. Planché's flowers. Reference is made in the preface to some of his separately-published poems, and to the list given might have been added a jocose version of "The Sleeping Beauty," which was illustrated by Mr. Richard Doyle. The complete neglect which befell this was a cause of annoyance and surprise to the author, who had a fondness for it, and could never understand why it had not become popular. It would have a better chance, probably, if it were produced now. What Planché wrote twenty years ago usually reads as well now as then. Take, for example, the following lines from "A Christmas Greeting," in the volume before us, which might have been written last week, so fully does it represent the cry of the moment:—

"The days they grow shorter and shorter,
The town's worse than ever for smoke,
Invention, necessity's daughter!
How long must we blacken and choke?
Contract with some wholesale perfumer
To wash off the soot as it falls,
Or let a gigantic consumer
Be placed on the top of St. Paul's.

Oh! strive by some channel to turn it,
Ere down our throttles it rolls;
Why can't the Gas Company burn it?
'Twould save them a fortune in coals.
Much longer we ne'er can endure it,
The smother each resident damns,
Unless something's done to cure it,
'Twill cure us like so many hams."

This quotation must be our justification, if any be needed, for going a little out of our way to recommend the "Songs and Poems" of a dear and much regretted friend.

VARIORUM.

THE *Magazine of Art*, as bound, makes a handsome, entertaining, and instructive volume. It is equally suited to the library shelves or the drawing-room table. A capital gift-book!——"The Metropolitan Masonic Calendar and Pocket-Book, 1881," and the "Illustrated Price List of Masonic Clothing," both come to us from the indefatigable Geo. Kenning. The fact that a second edition of the Pocket-book was last year called for and absorbed shows that it needs no further recommendation.——A new edition has been issued by Messrs. Longmans of "The Elements of Mechanism," by T. M. Goodeve, M.A. It is an excellent little book of its kind.——A new edition, also, has been published of the "Moulder and Founder's Pocket Guide," by Fred. Overman (London: Sampson Low & Co.). It is an American book, and to the present issue has been added a useful supplement on Statuary and Ornamental Moulding.——"Stationary Engine-driving: a Practical Manual for Engineers in Charge of Engines," has been written by its author, Michael Reynolds, with an earnest desire to raise the character of enginemen in this country, and it seems well calculatnd to effect its purpose.——The new serial story in the *Quiver*, entitled "In Vanity and Vexation," which is already exciting interest, is from the pen of the popular author of "Lost in the Winning," a story which achieved a success a few years ago in the same magazine.——The Christmas Number of the *Pictorial World*, produced under the superintendence of Dalziel Brothers, is likely to prove an attractive one.——A pile of children's books, magazines, and Christmas "Parts" have reached us. The *Boy's Own Paper* and the *Girl's Own Paper* both come from the *Leisure Hour* Office,—a recommendation by itself. "The Glad Time," with very good illustrations, is the "Little Folks" Annual (Cassell); "*Judy's* Annual" has some amusing sketches. "Four Flirts: their Cards, and how they Played them," by Ernest Warren, is the *Round Table* Annual. It is illustrated by Hal Ludlow, and will have many readers. "Cassell's Almanac" has, as usual, a wood engraving on every other page.

Miscellanea.

Technical Education.—The Cutlers' Company, being desirous to render further assistance in the development of a knowledge of the principles of science as applied to the materials used in the cutlery trade, have arranged for a course of lectures being delivered in the Hall of the Company during the ensuing winter season. Sir Henry Bessemer has kindly promised to commence the course, and will, on the 1st of December, read a paper "On the Manufacture and Uses of Steel, with special reference to its employment for Edge Tools." The admission will be entirely free, but by ticket, which may be obtained on application to the Hon. Secretary, addressed to the Cutlers' Hall.

London Custom House.—Messrs. Robert Boyle & Son, Holborn Viaduct, are at present ventilating this building with their patent air-pump ventilator, under the direction of her Majesty's Office of Works.

Architects in Ireland.—The *Irish Builder* is complaining sadly of the want of *esprit de corps* amongst the architects of Ireland, and writes thus:—"Here in Dublin (and indeed throughout the provinces) we have a class of architects who, with a few, a very few, honourable exceptions, are utterly unworthy of their profession, their country, or of any journalistic representation. It is with a sense of almost humiliation we write these words, for the men we speak of have been tried in every way, and have been found wanting. In this city, we have for some years past the semblance or make-believe of an Irish Institute of Architects; but we would be false to our principles and teachings if we would longer pretend there was any real Institute of Irish Architects in existence. The Central, the London, Glasgow, Edinburgh, Newcastle, Manchester, Birmingham, and some other architectural societies live, and work, and thus afford evidence of their vitality and usefulness, but the so-called Irish Institute exists only by courtesy upon paper or upon a zinc plate. It has done nothing, or next to nothing, for some years past, and from present appearances it intends to do nothing. It has no sessions or meetings, no papers are read, and once or twice, perhaps, in the year a faint echo is heard, as if some voice was crying out from the grave. On these occasions there is a sort of resurrection, at which about half a dozen members assist. The appearance of a new Viceroy in Dublin, or some event which calls forth an address or deputation from some other professions, calls also forth an apparition on the part of the dead or dormant Irish Institute,—and then come night and sleep again."

Plumbers Again.—Last week the roof of the Shirehall and Guildhall, Shrewsbury, was discovered to be burning. The fire is supposed to have been caused by plumbers who were working there on Thursday. By two o'clock the fire was got under by the local brigades, assisted by the Wem and Oswestry engines, and the railway engine. Fortunately the whole of the valuable paintings were saved, and as the strong rooms, both county and borough, are intact, the contents are supposed to be uninjured. The town clerk, Mr. E. C. Peele, and the clerk of the peace to the county, Mr. de Courcy Peele, will be great sufferers, as they carried on the business of solicitors, and the whole range of their offices, which were at the top of the building, are destroyed. The whole of the roof and floor under it are totally destroyed, with the exception of the strong rooms. The hall was commenced in the year 1834, and finished in 1837. The erection cost 12,000*l.* The building is insured heavily in the Salop Fire Office.

The Tay Bridge.—The *Scotsman* states that the plan adopted for the restoration of the Tay Bridge involves the complete abandonment and removal of the existing viaduct. The structure to be substituted for the abandoned bridge will be erected on a site in the immediate vicinity, but a little higher up the river, and will be of such breadth as to carry a double line of rails. It is not yet finally settled whether the piers of the bridge shall be of iron or brick; but if the former material be decided on, it will be in the form of malleable iron, security being further provided for by a largely-increased width of foundations. The cost of the works will be very considerably greater than was anticipated in the application to Parliament made last session.

Galvanised Corrugated Iron Roofing.—A correspondent asks us if roofing of this description is rendered more durable by painting. In a pure atmosphere galvanised corrugated iron will prove durable for a considerable time, but in London our belief is that it is necessary to paint such roofs. Messrs. Braby & Co., who have had a long experience, agree in this. They add, "In the case of zinc, however, which is a little more costly, painting is altogether unnecessary, and a roof covered properly with this material will last as long as three or four iron roofs."

The Royal Historical Society.—In this Society's Rooms, 22, Albemarle-street, on the 18th inst., a considerable number of members assembled to do honour to Lord Aberdare, the vice-president, by presenting to his lordship a terra-cotta bust of himself, from the studio of Mr. Henry Harvey, sculptor, a Fellow of the Society. Dr. Zerffi made the presentation. Lord Aberdare, in the course of his acknowledgment, spoke of the artist as a young man entirely devoted to his art, and with good ideas of what art should be.

Memorial Hall, Dover.—The Memorial Hall and Dover Tabernacle was opened on the 16th inst. The building has been erected for the requirements of a congregation gathered together by the labours of the Rev. J. F. Frewin, and consists of a hall capable of accommodating 500 persons (exclusive of galleries, for which provision has been made), school-rooms for 300 children, double vestries, and offices. The schools are placed in front on the first and second floors; the ground-floor being occupied by the entrance-corridor to the hall, staircase, and kitchen. The buildings are Early English in character. The front is built of red brick with Bath stone dressings, and the roofs are covered with Bangor slates. The heating of the hall has been accomplished by a Porritt's stove. The contract was undertaken for about 1,860*l.*, and carried out by Mr. Bromley, of Dover; Mr. Andrew T. Taylor, of London, being the architect.

Re-valuation of Fulham.—Mr. T. A. Marsh, clerk to the Assessment Committee, has favoured us (*Metropolitan*) with some particulars as to the recent revaluation of Fulham Union. We learn that an increase has taken place in the gross value of 118,328*l.* over the lists previously in force, and of 99,855*l.* in the rateable value. The total gross value was 665,521*l.*, and the rateable value 545,854*l.* Hammersmith parish has increased in gross value by 47,127*l.*, and in rateable value by 40,237*l.*, the total gross value for the parish being 231,597*l.*, and rateable value 190,136*l.* Fulham parish had increased in value by 71,200*l.* gross, and 59,608*l.* rateable, the totals for the parish being, gross, 433,923*l.*, and rateable, 355,718*l.*

TENDERS

For new offices, &c., for the Chorlton Board of Guardians, Manchester. Messrs. Mangnall & Littlewoods, architects:—

Brown, Stockport	£10,550 0 0
T. & W. Meadows	10,230 0 0
T. M'Farlane, Manchester	10,220 0 0
Ward	10,000 0 0
Brown	9,998 0 0
Davison	9,982 0 0
G. M'Farlane	9,900 0 0
Wilson, Toft, & Huntley	9,899 0 0
Davies & Mandsley	9,793 0 0
Neill & Sons	9,787 0 0
Southern & Sons	9,765 0 0
Webster	9,700 0 0
Elms & Evans	9,670 0 0
Napier	9,590 0 0
Herd	9,537 0 0

For residence at Sittingbourne, Kent. Mr. W. Leonard Grant, architect:—

Higgs & Hill, London	£1,994 0 0
Shrubsole, Faversham	1,848 0 0
Johnson, Faversham	1,748 0 0
Lawson, Whitstable	1,742 0 0
Foad, Whitstable	1,688 0 0
Paver, Sittingbourne	1,667 0 0
F. Higgs, London	1,648 0 0
Seager, Borden	1,647 0 0
Vaughan, Maidstone	1,592 0 0
Cornelius, Whitstable	1,587 0 0

For warehouse, Mill-street, Lambeth, for Mr. Charles Keartland. Mr. Stanley M'Murdie, architect. Quantities by Messrs. Sandall & Corderoy:—

Ansell	£987 0 0
Canning & Mullins	953 0 0
Ford & Sons	948 0 0
Higgs	942 0 0
Rice	839 0 0

For new residence for Mr. S. Morgan, jun., Severn Valley Mills, Newtown, Montgomeryshire, exclusive of stabling, conservatory, and laying out grounds. Messrs. Jones & Parke, architects:—

Williams, Newtown (accepted)	£1,390 0 0

For rebuilding the Founders' Arms public-house, Holland-street, Blackfriars, for Messrs. Daun & Vallentin. Mr. Wm. C. Banks, architect:—

W. & F. Croaker	£2,340 0 0
Ansell	1,901 0 0
Beale	1,898 0 0
Sharpe & Everard	1,840 0 0
Downs & Co., Southwark	1,830 0 0

For new front, &c., to 119, St. James-street, Brighton. Mr. Arthur Loader, architect:—

Lockyer	£593 0 0
Newnham	563 0 0
Bruton	539 0 0
Hackman (accepted)	523 0 0

For carpenter and joiners' work in the erection of a new Baptist Chapel on Victoria Town Estate, Deal. Quantities supplied. Mr. J. Wills, architect:—

G. H. Denne	£1,027 0 0
T. & W. Denne	964 0 0
Gibbons	900 0 0
Wise	885 0 0
Hayward	714 10 0
Trollope	688 0 0

For the erection of homestead at the Hall Farm, Akenham, Suffolk. Mr. Alfred Conder, architect:—

Girling, Ipswich (accepted)	£3,795 0 0

For the erection of a pair of semi-detached villas, Sebert-road, Forest-gate, for Mr. J. R. Toseland. Henry C. Smart, architect:—

Miller (accepted)	£636 0 0

For erection of new premises of the London and County Banking Company (Limited), Lewes. Mr. Edward Salter, architect:—

Pearless, Eastbourne	£2,815 0 0
Card, Lewes	2 731 0 0
Snewin, Littlehampton (accepted)	2,537 18 0

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All statements of facts, lists of tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication.

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